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EXTILE
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Y 8, 1944
ME 33, No. 10

AL PUBLICATION
of the
OCEEDINGS
AN ASSOCIATION
TILE CHEMISTS
COLORISTS

AMERICAN
DYESTUFF REPORTER

Beautify the beach

with Polar Brilliant Red 10 B, the latest and bluest of the acknowledged series of Polar Brilliant Colors.

Brilliant in the extreme, yet fast enough
to sun and salt water—
Dyeable by the simplest acid method,
yet splendid for brightening chrome colors—
Recommended for raw stock or slubbing,
yet entirely suited to yarns or pieces—

Polar Brilliant Red 10 B is a color you will be proud to exhibit in your line as a self-shade or in combination.

Leaflet No. 915 gives the complete story about Polar Brilliant Red 10 B.

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NEBRASKA
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GEIGY COMPANY INC.

89-91 BARCLAY STREET — NEW YORK—NEW YORK

Boston · Providence
Philadelphia · Charlotte
Toronto · Portland, Ore.

Geigy
Dyestuff Makers Since 1859

In Great Britain
The Geigy Colour Co., Ltd.
National Buildings
Parsonage, Manchester

What users of chemicals in industry have been able to accomplish in the face of wartime restrictions, can be credited largely to their efforts to investigate and apply timely new developments. It has been this effort...this willingness to try...that has been the spark of incentive to the producers and suppliers of chemicals in industry, resulting in redoubled effort in product research and development activities.

Where industry stands today...where it is headed for tomorrow...will continue to be a matter of pioneering in new materials, new applications and new methods of processing. Here at Cyanamid we are prepared to offer as part of our research and development program, sound counsel on the properties and applications for many timely new material developments and new uses for "old standbys." Your inquiry is invited.

AMERICAN CYANAMID
& CHEMICAL CORPORATION
(A Unit of American Cyanamid Company)
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

MANUFACTURERS OF
SULPHONATED OILS • PENETRANTS • FINISHES • SOFTENERS
SIZING COMPOUNDS • DECERESOL* WETTING AGENTS
AND OTHER SPECIALTIES FOR THE TEXTILE INDUSTRY
*Reg. U. S. Pat. Off.

American Dyestuff Reporter, Vol. 33, No. 10, May 8, 1944. Published every other Monday. Copyright, 1944, by Howes Publishing Co., 440 4th Ave. New York, 16, N. Y. Domestic subscriptions, $5.00; Canadian, $6.00; Foreign, $6.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y. Post Office, under the act of March 3, 1879.

Resin or No Resin

CHLORANTINE FAST RUBINE RNLL
CHLORANTINE FAST RED 6BLL
CHLORANTINE FAST SCARLET BNLL

Are . . .

"TOPS IN LIGHT FASTNESS"

Many familiar direct colors are forced to the bottom of the fast to light ratings by the effect of crush proof resins. The reds listed above are an exception. They stay on the top — where they have always been — resin or no resin.

Only their wash fastness is affected — and that is improved.

DYESTUFFS • CHEMICALS • INTERMEDIATES

CIBA COMPANY, INC.
Greenwich & Morton Sts.
NEW YORK

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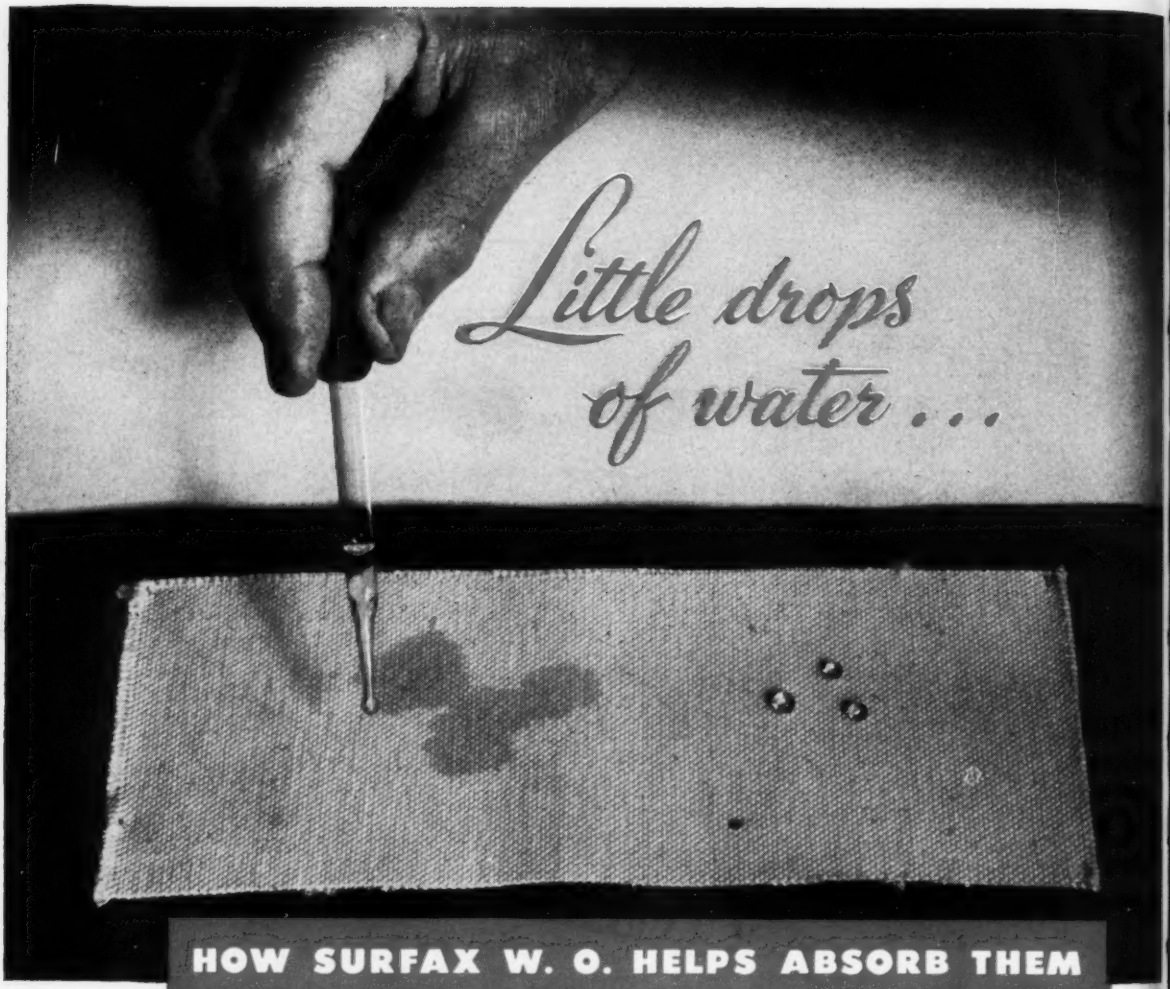
VAT DYES OF THE DOW CHEMICAL COMPANY



HOW SURFAX W. O. HELPS ABSORB THEM —AND FAST!

There's no magic about the above photograph. One-half the cloth was treated with Surfax W. O., the other half not treated. Then drops of spigot water were placed on each side, with the above result.

This ability to absorb water quickly means much in the sanforizing process. Fabric treated with Surfax W. O., then dried, will wet back faster when run through the sanforizing machine. That speeds up production—more yards per minute carefully preshrunk—which is the reason why so many leading sanforizers employ Surfax W. O.

An oil-type surface-active chemical, Surfax W. O. possesses unusual wetting out, wetting back and softening properties. It has fast wetting speed at low concentrations and at elevated temperatures.

In almost all wet processing operations, including sanforizing, you can use Surfax W. O. to excellent advantage. Why not ask the Houghton Man to prove it?

E. F. HOUGHTON & CO.

303 West Lehigh Avenue, Philadelphia 33

1301-05 West Morehead Street, Charlotte 1

SURFAX W.O.

FOR FASTER WETTING BACK

PERKINS
No CALENDER can be better
than the *ROLLS* in it
HOLYOKE

PERKINS

The SUPREMACY of
PERKINS
CALENDER ROLLS
is the natural result of the broadest
experience in the textile industry.

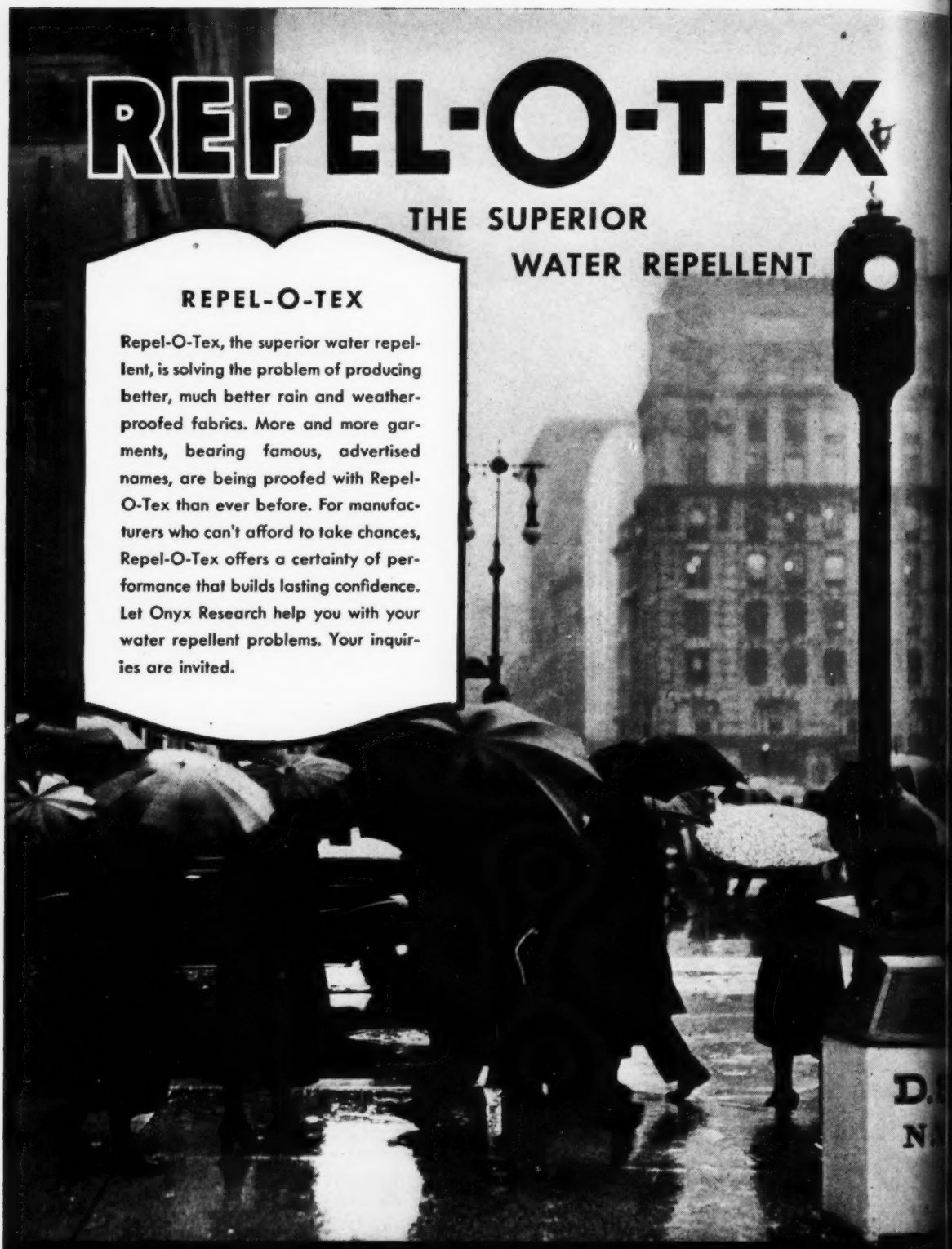
B. F. PERKINS & SON, Inc.
HOLYOKE, MASS., U.S.A.
LARGEST MANUFACTURERS OF CALENDER ROLLS IN THE WORLD

REPEL-O-TEX

THE SUPERIOR WATER REPELLENT

REPEL-O-TEX

Repel-O-Tex, the superior water repellent, is solving the problem of producing better, much better rain and weather-proofed fabrics. More and more garments, bearing famous, advertised names, are being proofed with Repel-O-Tex than ever before. For manufacturers who can't afford to take chances, Repel-O-Tex offers a certainty of performance that builds lasting confidence. Let Onyx Research help you with your water repellent problems. Your inquiries are invited.



ONYX OIL & CHEMICAL COMPANY

JERSEY CITY, N. J.

PROVIDENCE • CHARLOTTE • CHICAGO • LOS ANGELES • MONTREAL • TORONTO

ACID ALIZARINE ★ ACID ANTHRACENE ★ ALGOL ★ ALGOSOL ★ ALIZARINE

ALPHANOL ★ ANTHRACENE ★ ANTHRALAN ★ AZO ★ BENZO ★ BENZO FAST

COPPER ★ BENZO VISCOSE ★ BENZOFORM ★ BRILLIANT INDIGO ★ CELLITAZOL

CELLITON ★ CHROMOGENE ★ CHROMOXANE ★ DIAMINE ★ DIAMINOGEN

DIAMOND ★ DIANIL ★ DIA[illegible]NE ★ FAST ACID ★ FAST COLOR

SALTS ★ [illegible] COLOR [illegible] FAST LIGHT ★ FAST SULPHON ★ FASTUSOL

FLAVAZINE [illegible] ★ GALLO ★ GENSA ★ GENTEX ★ G[illegible] ★ HANSA

HELINDON ★ HELIO ★ HELIOGEN ★ HYDRON [illegible] ★ INDANTHREN

INDO CARBON ★ INDO[illegible]ANINE ★ [illegible] ★ JANUS [illegible]GEN ★ LITHOL

METANIL ★ METHYLENE [illegible]LING ★ MONOCHROME ★ NAPHTOLS ★ NAPH-

THALINE ★ NAPHTYLAMINE ★ NEOTOLYL ★ NEPTUNE ★ NIGROSINE ★ OXAMINE

OXYDIAMINE ★ OXYDIAMINOGEN ★ PALATINE FAST ★ PARA ★ PHENAMINE

PHENOFORM ★ PHLOXINE ★ PHOSPHINE ★ PLUTO ★ PLUTOFORM ★ PYRAMINE

RAPID FAST ★ RAPIDOGEN ★ RAPIDAZOL ★ RESORCINE ★ RHODAMINE

RHODULINE ★ SAFRANINE ★ STILBENE ★ SOLAR ★ SUDAN ★ SULPHON ★ SUPRA

LIGHT ★ SUPRAMINE ★ SUPRANOL ★ TARTRAZINE ★ THIAZINE ★ THIAZOL

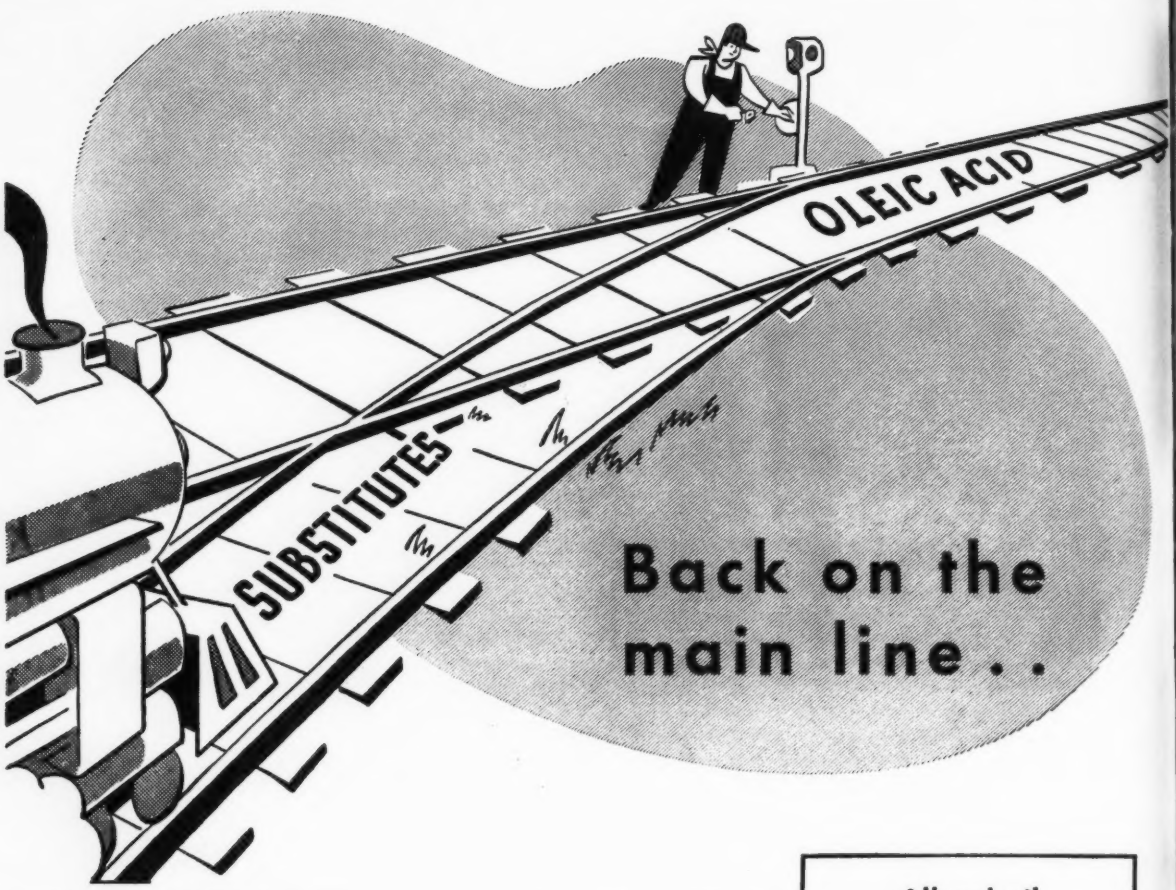
TOLUYLENE ★ VARIAMINE ★ VICTORIA ★ VULCAN FAST ★ WOOL FAST ★ ZAMBESI

Quality Dyestuffs

GENERAL DYESTUFF CORPORATION

FOUR-THIRTY-FIVE HUDSON STREET · NEW YORK · N. Y.

BOSTON · PROVIDENCE · PHILADELPHIA · CHICAGO · CHARLOTTE · SAN FRANCISCO



Back on the main line . .

As of April 1st, all red oil (oleic acid) has been removed from allocation, and our inventory position has improved to a point where we can make prompt shipment of all distilled and saponified grades of red oil.

The characteristics of textile soaps made from Emery's red oil are distinctly superior to those using other fats and fatty acids. They can be controlled for the specific use. They are uniform and free rinsing. Being entirely of animal origin and containing a minimum of highly unsaturated fatty acids, oxidation is held to a minimum.

Emery's red oils, both distilled and saponified, are available over a wide range of specifications. Let us know your problem, so we can recommend a suitable grade and type. We will gladly send you samples on request.

All red oil (oleic acid) off allocation

F. D. A. has announced that as of April 1st, all red oil can be sold subject only to the certification requirements of FDO 53 and FDO 87. Merely send your certified orders for your red oil requirements direct to us and prompt shipment will be made.

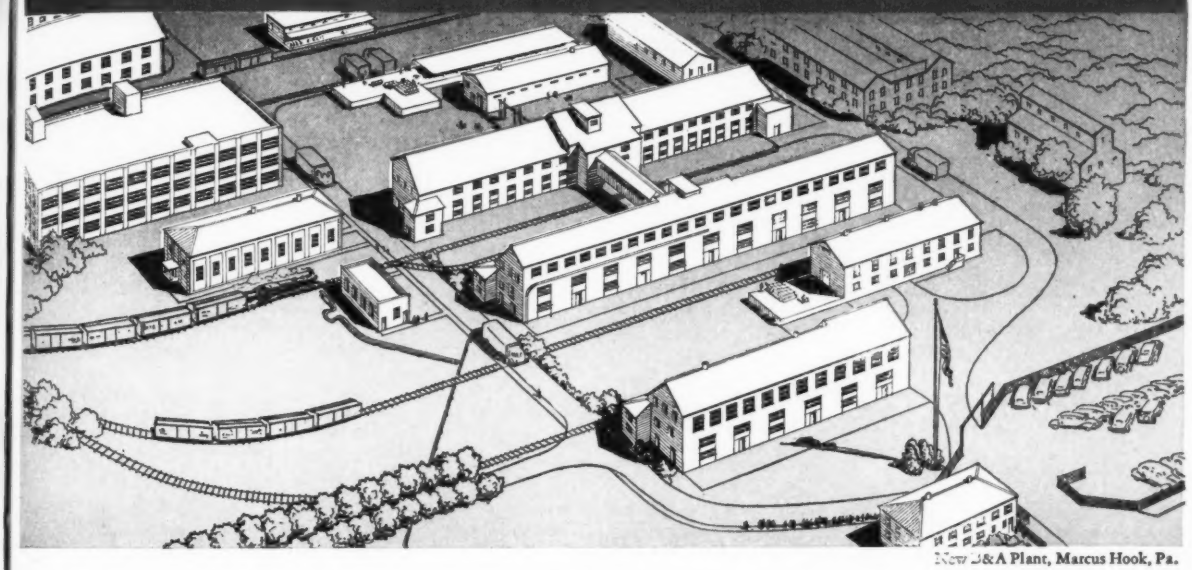
LABORATORY CONTROLLED THROUGHOUT PRODUCTION — EMERY INDUSTRIES INC.

EMERY INDUSTRIES · INC.

4300 CAREW TOWER · CINCINNATI 2, OHIO

New York Office: 3002 Woolworth Building, New York, New York · New England Office: 187 Perry Street, Lowell, Massachusetts

AGAIN *GENERAL CHEMICAL* CREATES NEW FACILITIES FOR BAKER & ADAMSON PRODUCTS TO SERVE AMERICAN INDUSTRY!



New J&A Plant, Marcus Hook, Pa.

THESE NEW FACILITIES for production of Baker & Adamson reagent and fine chemicals provide ideal manufacturing areas, additional research and development laboratories, and special storage and shipping accommodations. This plant's output, coupled with that of other Baker & Adamson producing units and distributing stations throughout the United States, marks another forward step in Baker & Adamson leadership.

Basic materials for many Baker & Adamson quality products made here come directly from sixteen of General Chemical Company's producing locations. With such fundamental sources of supply, including many Company-owned mines for raw materials, Baker & Adamson is in a pre-eminent and unique position for meeting the expanding uses of high-purity chemicals in industry.

Whether you require laboratory reagents, fine chemicals, or other products prepared in accordance with your formulae—avail yourself of the Baker & Adamson facilities. Experienced technical service representatives are ready to discuss *your* chemical problems and requirements. Baker & Adamson stocks are carried in many principal cities!

GENERAL CHEMICAL COMPANY

Fine Chemicals for Industrial America

GENERAL CHEMICAL COMPANY

40 RECTOR STREET, NEW YORK 6, N. Y.

Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) • Buffalo • Charlotte (N.C.) Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Milwaukee • Minneapolis New York • Philadelphia • Pittsburgh • Providence (R. I.) • St. Louis • Utica (N. Y.)

Pacific Coast Technical Service Offices:

Los Angeles • San Francisco • Seattle, Wenatchee and Yakima (Wash.)

In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

PRE-SOLD

It is no trick to buy a water repellent. But can you sell it? On the answer to that question depends your profit in this feature.

If the repellent you use is unknown you've got to put on a sales talk, and push it. If it is known and valued, as is "Cravenette" you are saved this effort. In short "Cravenette" is pre-sold and because of this your fabrics, treated with "Cravenette" water repellents will sell more readily.

Naturally, "Cravenette" will meet all your technical requirements, too. For instance, our "Cravenette" CBC water repelling preparations are easily applied by the one-bath method for either all-wool, or all-cotton fabrics; they are stable under a wide range of temperatures, and liquid at both high and low temperatures. Needless to say, with more than 50 years of experience back of them, "Cravenette" repellents also are accurately compounded, odorless, and have a minimum effect on the appearance and feel of the fabric. And, of course, they can be applied either from a washer or standing bath.

However, you would expect these features in any repellent of good quality. The big point of difference in "Cravenette" is that your customers know it and are glad to have it because, with the "Cravenette" trademark on the fabric or in the garment a real sales feature is provided. More to the point, both you and your customers can have this advantage at a cost that is no more than you would pay for repellents lacking this advantage. Write us and we will be glad to go into particulars.

Your fabric treated with

REG. U.S. PAT. OFF.

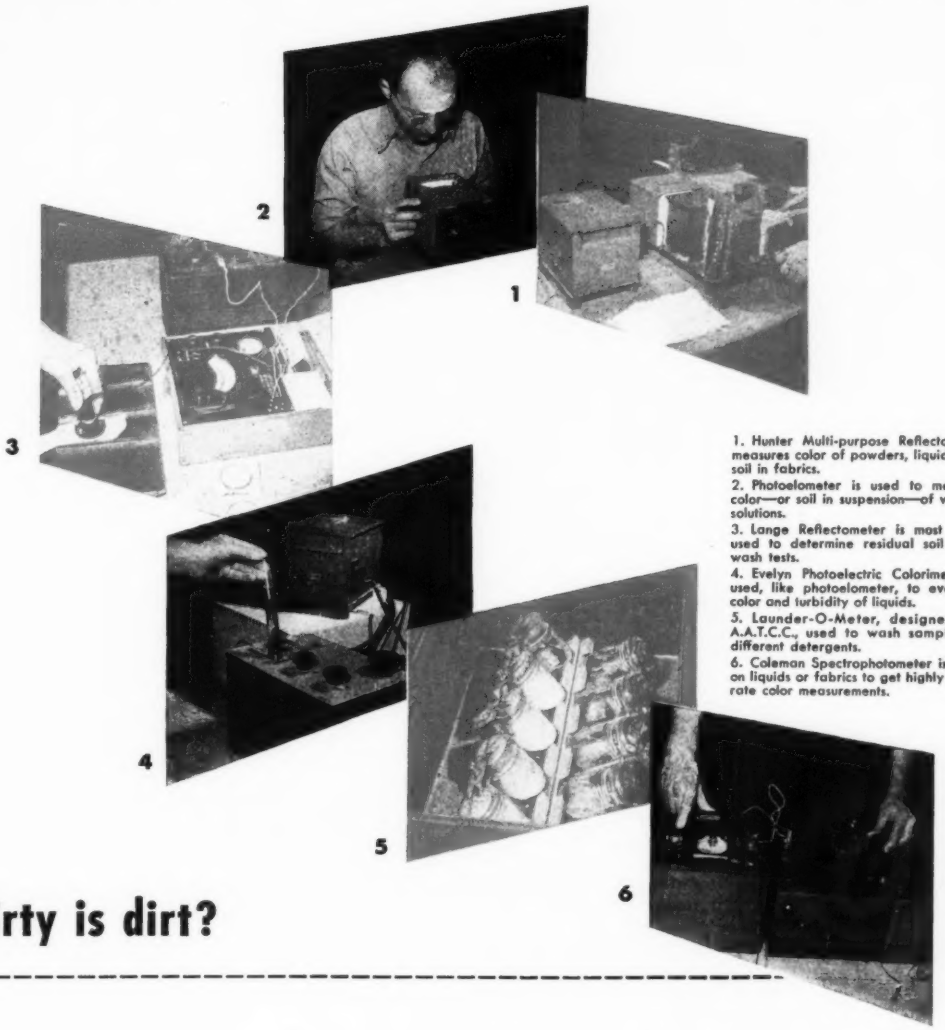
CRAVENETTE

water repelling preparations

SHEDS SHOWERS

"CRAVENETTE" is a trademark of The Cravenette Company, U. S. A., manufacturers and sellers of water repelling preparations. The Cravenette Company, U. S. A., and its licensed agents, apply these preparations to fabrics and garments.

THE CRAVENETTE COMPANY, U. S. A.
CHEMICAL DIVISION
8th and Madison Streets, Hoboken, N. J.



1. Hunter Multi-purpose Reflectometer measures color of powders, liquids and soil in fabrics.
2. Photoelometer is used to measure color—or soil in suspension—of various solutions.
3. Lange Reflectometer is most often used to determine residual soil after wash tests.
4. Evelyn Photoelectric Colorimeter is used, like photoelometer, to evaluate color and turbidity of liquids.
5. Launder-O-Meter, designed by A.A.T.C.C., used to wash samples in different detergents.
6. Coleman Spectrophotometer is used on liquids or fabrics to get highly accurate color measurements.

How dirty is dirt?

To the layman, this may sound like a silly question.

But both your textile research men and Monsanto's are often seriously concerned with the answer — so much so that precise and complicated instruments like the five shown above at Monsanto's Central Research Laboratories, are used to get accurate measurements of the amount of "dirt" present in a given fabric or soap bath.

The question arises, of course, in evaluating the efficiency of the detergents and the emulsifying, wetting and dispersing agents which are so vital in so many of your processes.

Like many problems these days in the development of new and better textiles and textile production methods, such evaluation calls for an amazing array of laboratory equipment — ranging from Launder-O-Meters and mill-type washers to sensitive photoelectric instruments like the reflectometer included in the group above. It also calls for men with specialized skills well leavened with practical experience in textile problems.

In fact, here is one more illustration of the need for close cooperation between progressive producers of both textiles and chemicals . . . and one more example of why it will pay *you* to work on *your* particular problems in partnership with a well-equipped team of textile chemical specialists like Monsanto's. MONSANTO CHEMICAL COMPANY.

Divisions cooperating in Monsanto's integrated research and technical service program for the textile industry: Organic Chemicals Division, St. Louis; Plastics Division, Springfield, Mass.; Phosphate Division, St Louis; and Merrimac Division, Everett Station, Boston 49. Inquiries should be addressed to Merrimac Division.

The Textile
SERVING INDUSTRY...WHICH SERVES MANKIND

MONSANTO
CHEMICALS — PLASTICS

Secret Agent

NO SECRET TO YOU—but the charming lady who bought this modishly tailored suit never even suspected that a processing agent had a lot to do with its style appeal. For the designer who created it could never have achieved the style appeal that sold it unless the material had been properly processed. That's why so many of America's leading mills, converters, finishers and dyers have turned to Colgate-Palmolive-Peet for high-quality wetting, fulling, scouring and dispersing agents.

There is a C.P.P. soap or synthetic detergent for every fabric—for every processing problem. Ask your local Colgate-Palmolive-Peet representative for detailed information on the full line of C.P.P. processing agents made specially for the textile industry. Or, write to our Industrial Dept. at Jersey City 2, N. J.

COLGATE-PALMOLIVE-PEET CO.

JERSEY CITY 2, NEW JERSEY
KANSAS CITY 3, KANSAS
JEFFERSONVILLE, INDIANA
BERKELEY 2, CALIFORNIA

COLGATE KWIKSOLV

COLGATE FORMULA 25

BADGER FLAKES

COLGATE WHITE SOAP FLAKES

ARCTIC CRYSTAL FLAKES

ARCTIC SYNTEX "M" BEADS

DON'T WASTE SOAP . . . **vital materials needed to win the war are used in making soaps.**

EASTONE* YELLOW GN

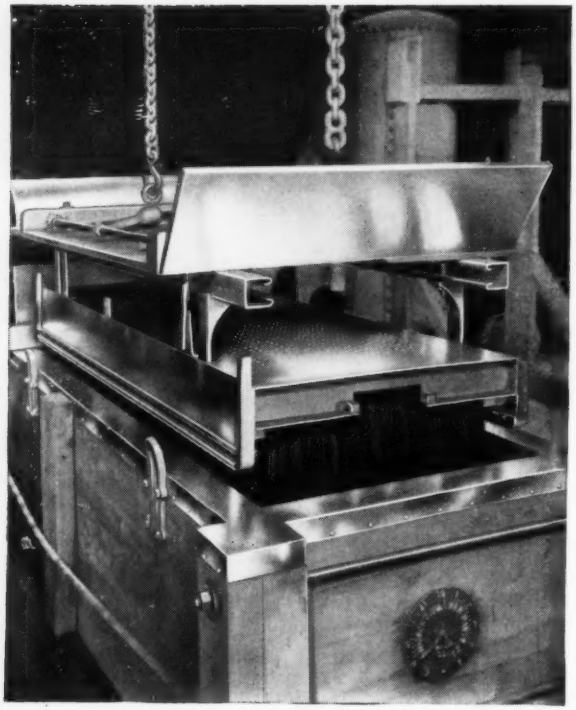
Eastone ***Yellow GN*** produces neutral shades of yellow on cellulose acetate rayon. Consequently, this dyestuff is extremely useful both as a self shade and as the yellow component in the mixture of grays, tans, greens, browns, and other tertiary shades. It dyes nylon an orange-yellow which has outstanding fastness to light.

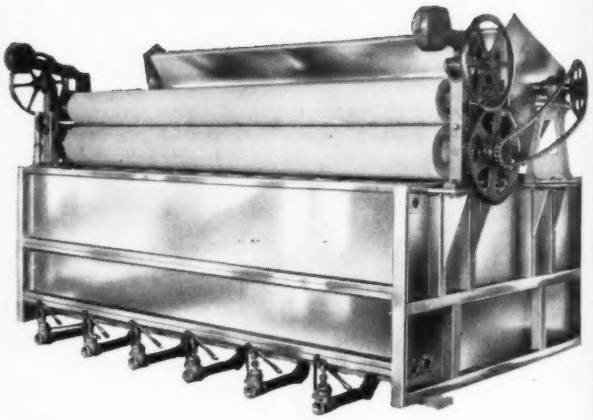
General commercial fastness of Yellow GN is unusually good—particularly with regard to gas fading, washing, crocking, and sublimation when steamed under pressure. It disperses readily and has good build-up and leveling properties in dyeings at either high or low temperatures. Yellow GN is recommended for application printing, for use on either a jig or a box, and for the formulation of dischargeable ground shades.

For information on Eastman Acetate Dyestuffs, consult our New York Sales Representative, 10 East 40th St., New York, New York, or write TENNESSEE EASTMAN CORPORATION (Subsidiary of Eastman Kodak Company), KINGSPORT, TENNESSEE.

EASTMAN ACETATE DYESTUFFS

** "Eastone" is a registered trade mark and denotes a type of dye which is dischargeable, as well as usable for plain dyeing.*



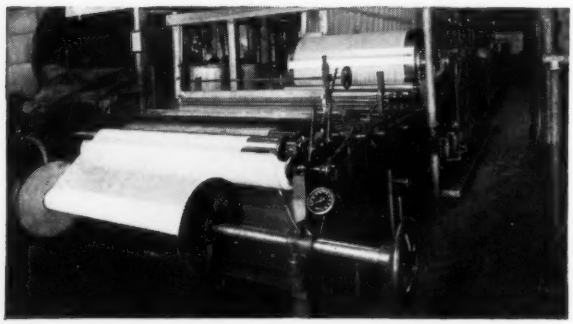


Even the most corrosive wash liquors are used with safety in this stainless steel slack-type rope washer (above).

The yarns dyed in this vat (left) are uniform, because stainless steel does not affect the chemicals used in dyeing operations.

In Wet-Processing,

STAINLESS STEELS RESIST CORROSION



The stainless steel sizing box and rolls of this 7-cylinder rayon slasher guarantee long-time service in high-speed operations.

The corrosive effect of dyes and many other chemicals on wet-processing equipment has ceased to be a problem for textile manufacturers who are using stainless steels in their mills.

They have found that stainless steel retains its mirror-like surface even after years of contact with synthetic and natural dyes, bleaching agents, and acids, as well as many other processing chemicals.

Almost as important as permanent resistance to corrosion is the ease with which stainless steel can be cleaned. Since no chemicals or dyes are absorbed by the metallic surface, there is no need for lengthy "boiling out," making possible quick successions of runs in a single vat.

Stainless steels offer advantages in other mill operations...they are long-wearing and need a minimum of maintenance...their permanently smooth, hard surface helps to prevent snagging, tearing, and snarling.

Although we do not make stainless steel, we have for more than 35 years produced the ferro-alloys used in making stainless and other alloy steels. From laboratory and plant experience we have gained practical knowledge of their applications, and are ready to give impartial assistance in the selection of a stainless or other alloy steel to meet your particular requirements.

BUY UNITED STATES WAR BONDS AND STAMPS

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

Electromet
Trade Mark
Ferro-Alloys & Metals

100% Acetate Rayon Fabrics now Dyed to Crown* Tested "Green Light" Requirements

LINE OF SIX COLORS RESISTS 60 HOUR GAS-FADING TEST

No. 26 of a series—from our files on the new "CROWN" Tested Plan

THE WRITING of this announcement began over five months ago...during a conference with North Carolina Fabrics Corporation. The subject under discussion was the perennial problem of dyeing acetate rayon fabrics. Though it had never been done before, North Carolina felt that acetate rayon fabrics could be dyed and finished to meet CROWN Tested "green light" requirements. We went over the standards one by one... considering every possible approach to the problem. The upshot was our decision to take on this job together.

So for months afterward we worked closely with North Carolina, exchanging dye formulas and routing procedures. Again and again we tested ideas. Again and again we compared results. Then one day North Carolina rang the bell! They had a method...

and they had proof that it worked. In actual use it produced the first 100% acetate rayon fabrics to pass the CROWN Tested requirements for washable fabrics:

Tensile Strength ..... 35 lbs.
Resistance to laundering ..... 160° F.
Resistance to sunlight ..... 40 hours
Resistance to atmospheric fading ..... AATCC Test

As a result, you'll find appearing on the market some truly revolutionary acetate rayon fabrics. Right now they come in only six shades... but as progress permits, they'll come in a wider and wider color range. They're "green light" fabrics... so they're washable, of course. And they are also resistant to sunlight... to crocking... to perspiration. They're even resistant to atmospheric fading. These all-acetate rayons show no trace of color loss after 60 hours' exposure to atmospheric gases—and that's six times the standard AATCC Test for gas fading!

New CROWN Tested Service Helps Toward Better Color Performance

Here you have a fine example of how intelligent cooperation solved a long-standing problem... and is producing far better, far more serviceable fabrics in the bargain!

We feel it's no exaggeration to call North Carolina's new method a record achievement. And naturally we're proud of the part contributed by the CROWN Tested Plan. We submit this whole story as evidence... convincing evidence indeed that the CROWN Tested way is the shortest way to customer and consumer confidence.

NEW INFORMATIVE LABELING

Consumer Satisfaction under the "Three Tag" System

*Reg. U. S. Pat. Off.

"Crown" Tested Rayon Fabric

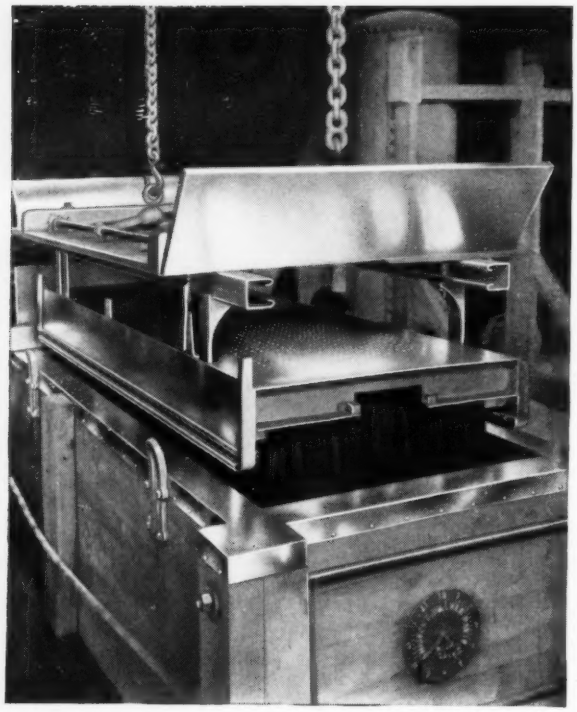
This is a stabilized fabric. Tests predict it will not change visibly in color or in texture, nor in size more than 2%, if instructions are followed. Samples of every dye lot of this fabric have been tested for stability and strength, according to minimum requirements set and maintained by

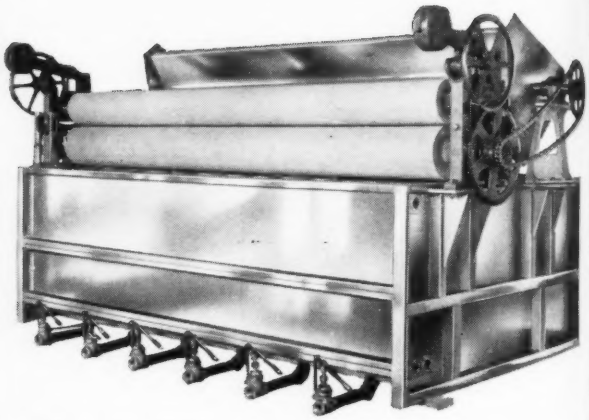
AMERICAN VISCOSE CORPORATION

Producer of CROWN *Rayon Yarns and Staple Fibers*

Sales Offices: 350 Fifth Avenue, N. Y. C. 1; Providence, R. I.; Charlotte, N. C.; Philadelphia, Pa.

A better way to buy Rayon Fabrics—This identification is awarded only to fabrics containing CROWN Tested Rayon, after they have passed the CROWN Tests for serviceability.





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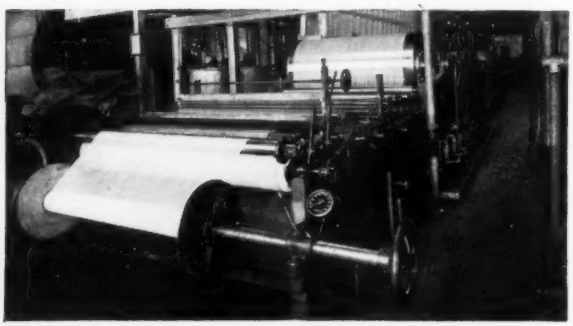

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LINE OF SIX COLORS RESISTS 60 HOUR GAS-FADING TEST

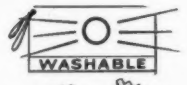
No. 26 of a series—from our files on the new "CROWN" Tested Plan

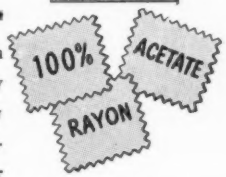
THE WRITING of this announcement began over five months ago...during a conference with North Carolina Fabrics Corporation. The subject under discussion was the perennial problem of dyeing acetate rayon fabrics. Though it had never been done before, North Carolina felt that acetate rayon fabrics could be dyed and finished to meet CROWN Tested "green light" requirements. We went over the standards one by one... considering every possible approach to the problem. The upshot was our decision to take on this job together.

So for months afterward we worked closely with North Carolina, exchanging dye formulas and routing procedures. Again and again we tested ideas. Again and again we compared results. Then one day North Carolina rang the bell! They had a method...

and they had proof that it worked. In actual use it produced the first 100% acetate rayon fabrics to pass the CROWN Tested requirements for washable fabrics:

Tensile Strength.....35 lbs.
Resistance to laundering.....160° F.
Resistance to sunlight.....40 hours
Resistance to atmospheric fading.....AATCC Test





As a result, you'll find appearing on the market some truly revolutionary acetate rayon fabrics. Right now they come in only six shades... but as progress permits, they'll come in a wider and wider color range. They're "green light" fabrics... so they're washable, of course. And they are also resistant to sunlight... to crocking... to perspiration. They're even resistant to atmospheric fading. These all-acetate rayons show no trace of color loss after 60 hours' exposure to atmospheric gases—and that's six times the standard AATCC Test for gas fading!

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Here you have a fine example of how intelligent cooperation solved a long-standing problem... and is producing far better, far more serviceable fabrics in the bargain!

We feel it's no exaggeration to call North Carolina's new method a record achievement. And naturally we're proud of the part contributed by the CROWN Tested Plan. We submit this whole story as evidence... convincing evidence indeed that the CROWN Tested way is the shortest way to customer and consumer confidence.

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*"MODINAL" *is the trade mark used by the Gardinol Corporation to designate a group of its fatty alcohol sulfates.*

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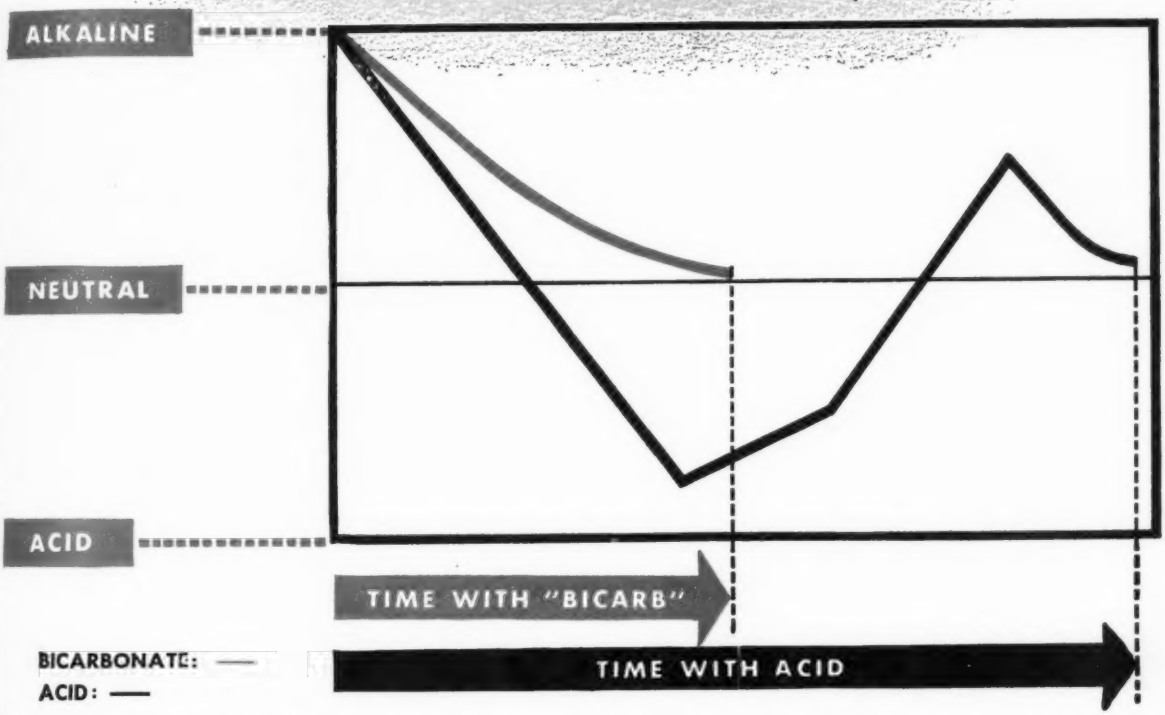

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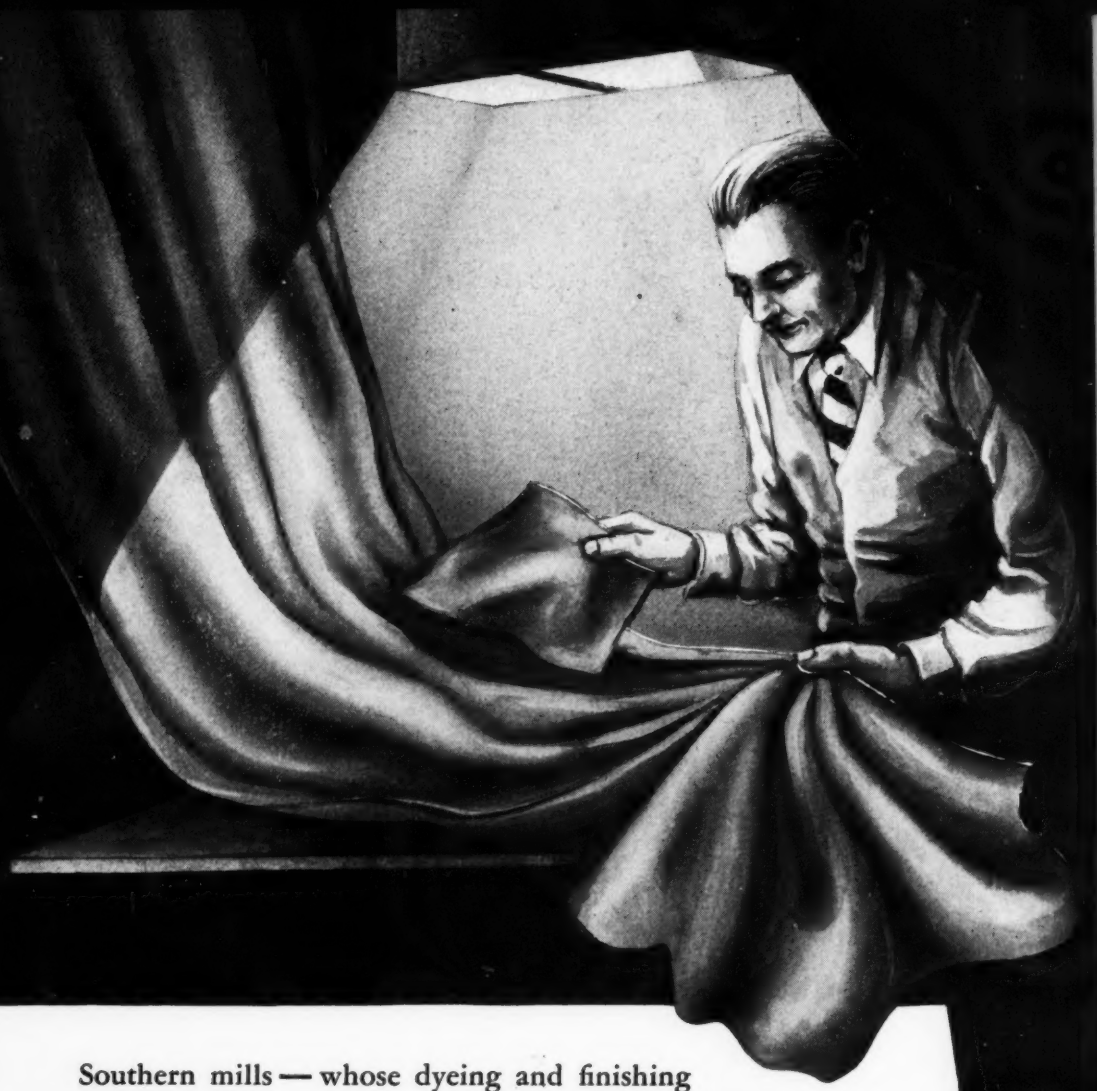

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AMERICAN DYESTUFF REPORTER

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WILL YOUR COLORS MATCH?

THIS IS THE YEAR the United Nations are asked to show their winning colors.

And that challenge holds just as strongly for the home front as it does for our fighting men.

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AMERICAN
DYESTUFF REPORTER

VOLUME 33 MAY 8, 1944 NUMBER 10

COMPRESSION METER FOR EVALUATING THE COMPRESSIBILITY AND RESILIENCE OF FABRICS

EDWIN C. DREBY[1]

RESEARCH NARRATIVE

THE compressibility of fabrics has been shown, by several investigators, to affect the hand or feel of fabrics, particularly their feeling of softness. Further studies of this property, during the course of a program sponsored by the American Society for Testing Materials at the National Bureau of Standards on the development of methods for the evaluation of textile finishes, indicate it to be one of several physical characteristics of a fabric affecting to a large extent the judgment of hand.

The studies indicate that the compressibility between pressures of 0.05 and 0.50 pound per square inch affected the judgment of the hand of the soft-finished, lightweight fabrics to which these studies were largely devoted. Thus a suitable apparatus for evaluating compressibility must operate at pressures within this range. The apparatus must also give reproducible results for materials of as uneven a texture as fabrics, with a minimum of time and effort. A compression meter was devised to meet these requirements. By means of the combined effects of compressed air and a column of liquid, pressure is applied to the test specimen through a very thin pliable membrane. The membrane allows the application of definite low pressures distributed uniformly over a large test area. The compressibility and compressional resilience are evaluated by observing the decrease in volume of the specimen as the pressure is increased and the increase in volume as the pressure is decreased.

Studies of the compressional characteristics of a variety of cotton and rayon dress and shirting fabrics, the feel of which had been evaluated tactually by a group of textile experts, showed several ways in which compressibility is appreciated by the hands. The compressional characteristics seem to affect directly the feeling of "thickness." They affect the feeling of "fullness" and it was found that the results of measurements obtained with the compression meter when combined with measurements of flexibility gave a quantitative evaluation of the fullness of fabrics. The measurements of fabrics thus far made with the compression meter shows it to be at least as sensitive as the hands to differences in compressional characteristics and thus indicate the suitability of the instrument for evaluating the finish of fabrics.

ABSTRACT

A compression meter was devised for evaluating the compressibility of soft-finished, lightweight fabrics under pressures between 0.05 and 0.50 lb/in^2. The combined pressures of a liquid column and air under pressure are transmitted to the test specimen through a very thin, pliable membrane. Thus low pressures are distributed relatively uniformly over the test area. The results of measurements were compared with the hand, or feel, of the fabrics as judged by a group of textile experts. These comparisons indicated that the compressibility affects directly the feeling of "thickness." By combining the results of measurements of compressibility and flexibility, a measure of "fullness" was obtained. The compression meter can also be used to evaluate compressional resilience.

I. INTRODUCTION

The compressibility of fabrics and its appreciation by the sense of touch have been studied by Schiefer [1],[2] Mecheels [2], Edwards [3], and Sommer [4]. The devices used by them for evaluating compressibility were considered in the course of a program on the development of methods for the evaluation of textile finishes sponsored by the American Society for Testing Materials and the National Bureau of Standards. These devices, intended primarily for heavily napped and pile fabrics, were not wholly satisfactory for evaluating the soft-finished, lightweight dress and shirting fabrics with which this study was principally concerned. Accordingly, it became necessary to provide a new test method.

At least two characteristics of these fabrics influence the choice of a method. First, the fabrics are relatively thin (thickness 0.005 to 0.025 inch). Irregularities in their construction such as thick yarns or knots may carry the load imposed by a testing device having a rigid presser foot and give a fictitious value so far as appreciation by the fingers is concerned. Second, the change in thickness of these fabrics with increase in load may be relatively great for very low loads and it is this change which seems to be most significant in affecting the hand of these fabrics. This is especially true of fabrics with a napped or brushed finish, which are covered with a readily compressible layer of fibers.

[1] Formerly Research Associate for the American Society for Testing Materials at the National Bureau of Standards, on the development of methods for the evaluation of textile finishes.

[2] Figures in brackets indicate literature references at the end of the paper.

Figure 1. Compression meter.

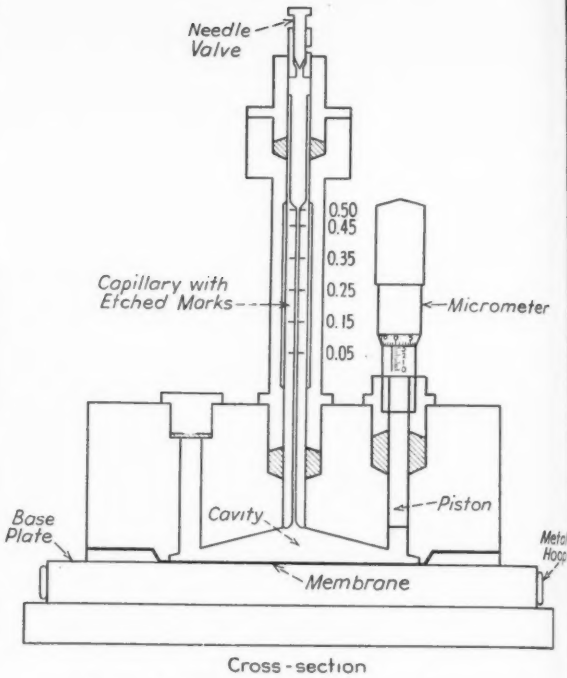


Figure 2. Cross-section of compression meter.

The compression meter devised to meet this need is described in this paper. It was described briefly in the ASTM Bulletin [5]. Examples are given of its application to the evaluation of compressibility and compressional resilience of some common types of fabrics, and the relationship of the results to the hand of the fabrics is indicated.

II. DESCRIPTION AND OPERATION OF THE COMPRESSION METER

A photograph of the compression meter is reproduced in fig. 1 and a line drawing of its cross-section in fig. 2. The body of the instrument is a metal cylinder with a circular opening 3 in. in diameter in the bottom. The opening is covered with a rubber membrane approximately 0.004 inch thick,[3] held in place by a metal flange. A conical cavity above the membrane leads to a graduated glass capillary tube, approximately one millimeter in internal diameter, which extends upward through a metal support. An enlargement in the upper part of the capillary is closed at the top by a needle valve. The graduations on the capillary correspond to pressures of 0.05, 0.15, 0.25; 0.35, 0.45, and 0.50 pound per square inch at the membrane when the level of the liquid with which the cavity is filled is at these respective marks. Two wells lead to the cavity from above. One is closed with a cap and is for the introduction of the liquid. A graduated screw micrometer is mounted over the other well. The stem of the micrometer acts as a piston by means of which the volume of the cavity can be varied by known amounts. The area of the cross-section of the stem is 0.0491 square inch (diameter ¼ inch). The micrometer is graduated to 0.001 inch. The cavity is filled with an 8 per cent aqueous solution of potassium dichromate. The dichromate prevents the steel micrometer from rusting and serves to color the liquid so that it can be seen in the capillary. The cylinder is hinged to a base plate, 4 inches in diameter, which is surrounded by a metal hoop for holding the specimen for test over the plate. Three toggle bolts are provided for clamping the cylinder to the plate.

In making a test, the micrometer is turned to decrease the level of the liquid and insure that it will be below the lowest mark on the capillary (0.05 lb./in.^{2}) when a specimen is mounted in the instrument. A specimen is then laid over the base plate, the hoop is placed over it, the cylinder is swung into place and is fastened securely. The needle valve is opened and the micrometer is turned until the level of the liquid is raised to the lowest mark on the capillary. If the level of the liquid is already above this mark, the micrometer is adjusted to bring it below the mark, the specimen is removed, and another specimen is mounted in the instrument, for it is essential that the specimen be subjected to no greater pressure immediately before its measurement than the lowest pressure at which a measurement is desired. A period of one-half minute is allowed to elapse after bringing the level of the liquid up to the mark. During this time the micrometer is further adjusted so that the level remains at the mark on the capillary. Then the micrometer setting is recorded. This setting corresponds to a pressure of 0.05 pound per square inch over the area of fabric covered by the rubber membrane. The pressure is produced by the weight of the liquid only.

The needle valve is then closed for the remaining part of the test. The micrometer is further adjusted to raise the

[3] Furnished by American Anode Inc., 60 Cherry St., Akron, Ohio.

level of the liquid to the next mark on the capillary. Again one-half minute is allowed to elapse during which the micrometer is adjusted if necessary to keep the level of the liquid up to the mark. Then the micrometer setting is recorded. This setting corresponds to a pressure of 0.15 pound per square inch, the pressure being produced in part by the weight of the liquid and in part by the compression of the air in the cavity above the capillary. This process is repeated at each of the pressures for which a reading is desired.

The procedure is now reversed and the micrometer settings corresponding to the several pressures are observed as the pressure is removed from the fabric. After taking the reading corresponding to 0.05 lb./in.,^{2} the needle valve is opened and a check reading is made. A difference in the last two readings indicates that the instrument is not working properly and that there has been leakage of either liquid or air.

The procedure may, of course, be varied to fill particular needs. For instance, the fabric may be subjected to a given pressure for a longer time.

Measurements with the compression meter should be made where temperature variations are not likely to occur during the course of a measurement on any one specimen. If the instrument is calibrated for use at 70 degrees Fahrenheit, at 75 degrees the indicated pressures will be in error by 0.01 per cent and the micrometer reading in error by less than 0.001 inch. If a 5 degree temperature change occurs during the measurement the indicated pressures may be in error by 1.05 per cent. Under the latter condition the micrometer reading may be in error by 0.030 inch. For the average fabric this would amount to an error of approximately 10 per cent but for relatively non-compressible fabrics the error would be even greater. Thus it is not so important to make the measurements at the calibration temperature of 70 degrees as it is to guard against fluctuations in the temperature during the course of a measurement on any one specimen.

III. CALIBRATION AND MAINTENANCE OF THE COMPRESSION METER

The pressure at the surface of the membrane of the compression meter was determined in the following manner. A shallow pan was clamped to the bottom of the instrument. An outlet in the pan was connected by a rubber hose to a vertical glass tube having an internal diameter of one-half inch. The pan was filled with water and, by means of a reservoir connected to the glass tube, the water level could be adjusted to any desired height in the glass tube, thus making it possible to vary the hydrostatic pressure at the membrane. Arbitrary marks were put on the capillary of the compression meter at measured distances above the membrane. The water level in the auxiliary apparatus was adjusted until the level of the liquid in the compression meter was brought in turn to each of the markings on the capillary, the needle valve being opened or closed in accordance with the directions in the preceding section. The head of water above the membrane then indicated the pressure at its surface. From these results the positions of the desired scale graduations were calculated.

Since in actual use the micrometer setting for any given pressure will vary, depending upon the nature of the fabric measured, the calibrations at each pressure were made for a wide range of micrometer settings to determine the effect of the distension of the membrane on the pressure. The distension of the membrane within the limits of its use in the compression meter did not produce an error greater than one and one-half per cent of the indicated pressure.

The pressure at the surface of the membrane when the compression meter is operated as previously described was also found from the height of the water in the capillary corrected for capillary rise and the increase in pressure of the air above the fluid with the needle valve closed. The latter was obtained from the volume of the air, the change in level of the fluid, and the area of the cross-section of the capillary. The calculated pressures were in good agreement with those determined experimentally, indicating that methods of locating the positions of the permanent marks on the capillary are satisfactory.

In order to maintain the compression meter in good operating condition, the capillary should be kept filled with the fluid when it is not in use. The body of the instrument should be clamped to the base to protect the membrane from light and other sources of injury. If the capillary becomes dirty, shown by sticking of the liquid on its walls, it may be cleaned with chromic acid cleaning solution or with alcohol and ether. With reasonable care, the membrane will last at least five or six months and it can be replaced readily.

IV. DEFINITIONS

Compressibility is defined as the decrease in volume per unit volume per unit increase in pressure. It is expressed by the equation

$$\text{compressibility} = \frac{(V_1 - V_2)}{V_1\ (P_2 - P_1)} \quad (1)$$

where V_1 and V_2 are the volumes at pressures P_1 and P_2 respectively. The value of V_1 cannot be measured directly with the compression meter. However, if the thickness at a pressure of 1.0 lb./in.,^{2} as measured with the compressometer described in reference 1, is used to compute the volume of the specimen under test, then the value of V_1 is given by MV_p where V_p is the volume at a pressure of 1.0 lb./in.^{2} and M is a numerical constant. The compressibility is then given by equation 2.

$$\text{compressibility} = \frac{(V_1 - V_2)}{MV_p\ P_2 - P_1)} \quad (2)$$

By expressing the factors in equation (2) in terms of the quantities measured by the compression meter and its physical constants, the expression for the compressibility in in.^{2}/lb. or $\frac{\text{in.}^3/\text{in.}^3}{\text{lb./in.}^2}$ becomes

$$\text{compressibility} = \frac{a(R_1 - R_2) - V}{ATM\ (P_2 - P_1)} \quad (3)$$

where R_1 and R_2 (inches) are the micrometer readings at pressures P_1 and P_2, respectively; V (in.^{3}) is volume of

fluid required in the capillary tube to increase pressure from P_1 to P_2; "a" (in.^{2}) is the cross-sectional area of the micrometer stem; A (in.^{2}) is the area of the specimen covered by the rubber membrane; T (inches) is the thickness of the specimen at a pressure of 1.0 lb./in.^{2}; and P_1 and P_2 (lb./in.^{2}) are initial and final pressures, respectively.

For most of the studies reported in this paper, the pressure range selected was 0.05 to 0.45 pound per square inch, so that, substituting these values and the numerical values of a, A and V in equation (3), the compressibility is given by equation (4)

$$\text{compressibility} = \frac{0.01736}{TM}(R_1 - R_2 - 0.030) \quad (4)$$

The difference in the micrometer readings is more useful, as shown later, in evaluating hand than the compressibility itself. Accordingly, the difference in micrometer readings for the pressures of 0.05 and 0.45 pound per square inch will be referred to as the "compression meter value" for convenience. The compression meter value is analogous to the "total compression," a property commonly used in discussing compressional characteristics.

The compressional resilience is defined as the ratio, expressed as a percentage, of the work recovered from a compressed specimen to the work of compression. An approximate value of the work of compression is computed by means of equation (5).

$$\text{Work} = 0.10a\,(R_{.05} + R_{.15} + R_{.25} + R_{.35} - 4R_{.45} - 0.075) \quad (5)$$

where $R_{.05}$, $R_{.15}$, $R_{.25}$, $R_{.35}$ and $R_{.45}$ are the micrometer readings during compression at pressures of 0.05, 0.15, 0.25, 0.35, and 0.45 lb./in.^{2}, respectively, and the term 0.075 is the correction for the volume of liquid used in the capillary. The work recovered is also computed by means of equation (5) using the micrometer readings during recovery.

V. RESULTS OF MEASUREMENTS AND SENSITIVITY OF THE COMPRESSION METER

For a discussion of the compressional characteristics of fabrics and their relation to hand, data were obtained on three sets of fabrics, one a set of 18 cotton percales having 80 yarns per inch in both warp and filling, the second a set of four cotton fabrics, thread count 100 warp and 56 filling, and the third a pair of spun rayon fabrics.

The relative order of the 18 percales, with respect to "fullness" [7] was determined independently by each of seven textile men experienced in handling fabrics of this type. The average of the seven individual relative ratings for each fabric was taken to represent each fabric's relative fullness. The "average mean deviation"[4] of the experts' individual ratings for fullness was ±3.1 units of rating. These fabrics were also divided into two groups according to whether they felt "thin" or "thick" in the hands. The fabrics are listed in table 1 in the order of decreasing fullness. They were numbered to correspond with their positions in this table.

[4] The "average mean deviation" is used in this paper to signify the average, for all fabrics, of the average deviation from the mean of the observations for each fabric.

The results of the measurements of the percales with the compression meter are also given in table 1.[5] The average mean deviation of the compression meter values was ±0.006 inch. In addition, these fabrics were measured with the Planoflex [5], a device for evaluating flexibility, and their thicknesses under a pressure of one pound per square inch were measured. The specimens for all the measurements were conditioned in an atmosphere of approximately 70°F. and 65 per cent relative humidity and measured in that atmosphere. The values reported in the table are the averages of ten observations with the compression meter, two with the Planoflex and ten of the thickness.

In table 2 are given the results of measurements with the compression meter and the Planoflex of the 100x56 cotton fabrics and the spun rayon fabrics. The results are the averages of two measurements of each property. The average mean deviation of the compression meter values for the cotton fabrics was ±0.010 inch and for the spun rayon fabrics was ±0.015 inch. These fabrics were evaluated tactually for fullness, the relative order being indicated in the table.

The criterion of adequate sensitivity of an instrument for evaluating characteristics of hand is its ability to detect differences as small as can be appreciated by the hands. An arbitrary method for determining the respective abilities of the instrument and the hands to distinguish differences is to compare the ratios of the range of values obtained to the average mean deviation. These quantities are an indication of the number of distinct regions, within the range of values exhibited by the fabrics, which might be detected by the method of measurement. The data for the compression meter give a ratio of 5 and the tactual data for fullness (which as shown later involves compressional characteristics) give a ratio of 4. The data are too limited to be conclusive but they seem to indicate that the compression meter is at least as sensitive as the hands to the compressional characteristics of these fabrics.

The differences in fullness between the four 100x56 cotton fabrics and between the pair of spun rayons were readily detected with the hands. The average mean deviation of the compression meter values was only a small fraction of the total difference in values for each successive pair of fabrics, when taken in order of increasing fullness, indicating that the compression meter distinguishes between these fabrics.

Other studies of cotton print cloths, cotton sateens, and spun rayon fabrics in the course of this work have shown that where differences in hand related to compressional characteristics were observed, the compression meter clearly distinguished these differences. Most of these conclusions are based on the averages of two measurements

[5] The results given for this series of fabrics were determined with an earlier form of the compression meter and are for pressure conditions somewhat different from those described in the paper. This does not affect the significance of the results in comparing these fabrics with one another.

TABLE 1
Compression meter values of 80x80 cotton percales and their fullness

Fabric designation	*Average relative fullness rating*	*Compression meter value*[a]	*Thickness*	*Compressibility factor*[b]	*Planoflex distortion angle*	*Compression meter value Planoflex value*	*Compressibility factor Planoflex value*
		inch	*inch*		*degrees*		
1	3.1	0.061	0.0078	7.8	4.0	0.0153	1.95
2	5.0	.057	.0074	7.7	3.8	.0150	2.03
3	[c]5.1	.048	.0070	6.9	3.0	.0160	2.30
4	[c]5.2	.050	.0076	6.6	6.5	.0077	1.02
5	[c]5.5	.052	.0064	8.1	1.8	.0289	4.50
6	7.7	.061	.0075	8.1	6.5	.0094	1.25
7	[c]8.7	.054	.0075	7.2	4.3	.0126	1.67
8	10.4	.058	.0081	7.2	8.5	.0068	0.85
9	10.4	.066	.0076	8.7	11.5	.0057	.76
10	[c]10.6	.042	.0082	5.1	7.0	.0060	.73
11	[c]11.2	.053	.0078	6.8	10.8	.0049	.63
12	[c]11.4	.047	.0077	6.1	10.3	.0046	.59
13	12.2	.065	.0090	7.2	10.5	.0062	.69
14	12.9	.063	.0083	7.6	11.3	.0056	.67
15	13.1	.061	.0081	7.5	12.3	.0050	.61
16	[c]14.5	.042	.0073	5.8	8.5	.0049	.68
17	[c]14.9	.057	.0080	7.1	16.8	.0034	.42
18	16.3	.037	0072	5.1	12.0	.0031	.42
Kendall Correlation Coefficient.		12%		33%	66%	76%	75%

[a] The compression meter values listed were determined with an earlier form of the compression meter and are for pressure conditions somewhat different from those described in the paper.

[b] The compressibility factor is the ratio of the compression meter value and the thickness.

[c] These fabrics felt "thin" to the experts. All others felt "thick."

with the compression meter. Further measurements are required to determine the number of specimens that should be measured to give a reproducible average value with some desired degree of sensitivity. The present studies indicate that the necessary number of specimens will be small, probably between two and five.

VI. COMPRESSIBILITY AND ITS RELATION TO HAND

The compressional characteristics of a fabric seem to be appreciated by an observer in two different ways. First, one recognizes a feeling of hardness or softness which is related to the extent the fabric yields under pressure. This is exemplified by the soft feeling of a blanket. Second, one recognizes a feeling of apparent "thickness" which is not to be confused with the fabric's actual physical thickness. This impression is obtained mainly from lightweight fabrics, like dress and shirting materials. This feeling of "thickness" seems to be the result of a piling up of the fabric before the fingers as the fabric is drawn through them.

The impression of "thickness" contributes to another quality of hand, termed by textile experts, "fullness." Fullness, like most other qualities of hand, is the simultaneous reaction to several physical properties of a fabric, the principal ones being compressibility, thickness, flexibility, and resilience. Changes in any one or all of these properties of a fabric in the direction of greater compressibility, greater thickness, lesser flexibility and greater resilience seem to give the fabric greater fullness. The relations between these several physical properties, individually and in simple mathematical combinations, and the qualities of hand are illustrated by the data in tables 1 and 2.

TABLE 2
Fullness, compressibility, flexibility, and resilience of two groups of fabrics

Fabric designation	*Relative fullness rating*	*Compression meter value*[a]	*Planoflex distortion angle*	*Compressional resilience*[b]	*Compression meter value Planoflex value*	*Compression meter value X Resilience Planoflex value*
		inch	*degrees*	*percent*		
			100x56 cotton fabrics			
a	1	0.502	4.0	31	0.126	0.039
b	2	.446	4.5	32	.099	.032
c	3	.410	4.5	34	.091	.031
d	4	.362	6.5	40	.056	.022
			Spun rayon fabrics			
e	1	.380	.8.0	67	.048	.032
f	2	.580	11.0	45	.053	.024

[a] The compression meter values listed are the micrometer displacements, in inches, necessary to change the pressure on the fabric from 0.05 to 0.45 pound per square inch.

[b] The compressional resilience is the ratio of the area under the recovery curve to the area under the loading curve of compression meter micrometer values versus membrane pressures between the limits of 0.05 and 0.45 pound per square inch.

The percales (table 1) that felt "thin" to the experts all gave compression meter values of 0.057 and below and they were the only percales giving results below 0.057 except fabric No. 18. All of the "thin" fabrics except No. 5 had compressibility factors[6] 7.2 and below, and these were all the fabrics that had factors below 7.2 except No. 18. The physical thickness of the fabrics does not bear any such relation to the "thickness" or "thinness"

[6] The term "compressibility factor" is used for the series of percales since the pressure range for which the compressional characteristics were determined was not precisely known. The quantities given in the table are the ratio of the compression meter value to the thickness of the fabric.

of these fabrics, so it seems that the latter is primarily associated with the compressional characteristics of the fabric. A further analysis of these data indicates that the compression meter values are better indications of "thickness" than the compressibility factors.

The use of the compression meter value for indicating "thickness" is analogous to the use, described by Sommer (4), of the absolute difference in thickness of a fabric at two specified pressures for indicating "softness."

"Thinness" and "fullness" are separate qualities of hand, as shown by the general distribution of the "thin" fabrics throughout the range of fullness exhibited by these fabrics. The compressibility is not entirely without effect on fullness, however. Two quantities were computed from the measurements, one the ratio of the compression meter value to the Planoflex value (the angle of distortion which is a measure of a fabric's flexibility) and the other the ratio of the compressibility factor to the Planoflex value. By a method described by Kendall[7] the degree of correlation between the order of the fabrics determined by each of the above two computed quantities and the order determined by the average relative fullness ratings was computed and found to be 76 per cent and 75 per cent, respectively. These correlation coefficients indicate a highly significant relationship between each of the computed quantities and the tactual ratings of fullness.

The results of determinations of the compressional resilience and the flexural resilience of the percales showed there were no significant differences in these properties among these fabrics. Consequently the effect of resilience on fullness could not be studied with these data.

In the series of fabrics discussed above, flexibility was a very large factor in their fullness since the Planoflex values themselves showed a very significant relationship (Kendall correlation coefficient of 66 per cent) to the average relative fullness ratings. While it is apparent that the quantity combining compression meter value with flexibility is a better representation of the fullness of these fabrics than flexibility alone, more conclusive evidence of the role of compression meter value in fullness is shown by the data in table 2 for four 100x56 cotton fabrics, each treated with a different kind of finishing agent. Fabrics "a", "b", and "c" have about the same flexibility, as indicated by their Planoflex values, but their fullnesses are quite different and show a direct correlation with the fabrics' compression meter values (determined in the manner described in this paper). Fabric "d" is not only less compressible but also is more flexible so it lacks fullness, which is in accord with the tactual rating of this fabric. Fabric "d" has more compressional resilience than the others but not enough more to change its relative order of fullness, as shown by the quantities in the last column of table 2, which include the compressional resilience as a factor in the quantity for representing fullness.

Some finishes, however, greatly increase a fabric's resilience. Fabrics "e" and "f" in table 2 are a pair of spun rayon fabrics of the same construction but "e" was treated to make it resistant to creasing with a consequent increase in flexural resilience, and "f" was untreated. The ratio of compression meter value to Planoflex value indicates "f" is the fuller. However, "e" is the fuller by tactual evaluation. This is attributable to its resilience as shown by the quantity in which the compressional resilience[8] has been included.

These studies indicate that the compressional resilience of similarly finished fabrics of the same construction generally does not vary greatly and therefore that this factor does not affect materially the relative fullness of such fabrics. In view of Sommer's work and the importance of thickness of fabrics in the expert's evaluation of fullness, it would seem that the compression meter value divided by the Planoflex value should represent fullness better than the compression meter value alone. This ratio is proposed, tentatively, as a simple and practical means for representing the fullness of a fabric.

In studying the relative effects of the physical properties of a fabric on its fullness, only the simplest combinations of the measured physical properties consistent with their relationship to fullness were investigated. Even though the simple ratio of the compression meter value to the Planoflex value was an excellent representation of the fullness of practically all of the fabrics studied during the course of the program for which reliable tactual data were available, the complex nature of fullness warrants further study of a greater range of fabrics and finishes to establish the general utility of its application.

[7] The Kendall coefficient of correlation between two series of rankings is given by $2\Sigma/n(n-1)$, where n is the number of members ranked and Σ is computed as follows: The members are put in objective order in the one series which then determines the corresponding order of the rankings for the other series. Each member in turn of the latter sequence of rankings is compared with succeeding members in the sequence. Those pairs in the correct sequence are given a value of +1 and those in the inverted sequence are given a value of —1. The sum of these values is denoted as Σ. The method is described in detail by Schwarz and Winn in Technical Evaluation of Textile Finishing Treatments. III. Use of Rank Correlation for Comparison of Data, American Dyestuff Reporter *29*, p400 (1940); Textile Research *10*, 453 (1940).

[8] The compressional resilience has been used in these expressions for practical convenience. Since the compressional resilience and the flexural resilience seem to have a close relationship as evidenced in fabrics "e" and "f" and in other fabrics studied, the former property was used to indicate the dependency of fullness on the resilience of the fabric.

VII. REFERENCES

(1) H. F. Schiefer, The Compressometer, an instrument for evaluating the thickness, compressibility and compressional resilience of textiles and similar materials. BS J. Research *10*, 705 (1933).

(2) O. Mecheels, Textiles: Softness measurements. Melliand-Textilberichte *14*, 244 (1933).

(3) C. H. Edwards, Knitted fabrics: Thickness, weight and compressibility. J. Textile Institute *25*, T277 (1934).

(4) H. Sommer, Compressibility and softness: Fibers, yarns, fabrics. Melliand-Textilberichte *17*, 630, 712, 786 (1936).

(5) E. C. Dreby, Development of methods for the evaluation of textile finishes. ASTM Bulletin *114*, 15 (1942).

(6) E. C. Dreby, The Planoflex, a simple device for evaluating the pliability of fabrics. J. Research NBS *27*, 469 (1941).

(7) Terms relating to the hand of fabrics. Amer. Dyestuff Reporter *29*, 560 (1940).

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

MAY 8, 1944

MEETING, SOUTH CENTRAL SECTION

THE April meeting of the South Central Section was held Saturday evening, April 1, 1944 at the Read House, Chattanooga, Tenn.

Dinner was served at 7:00 p.m. and was attended by seventy-three members and guests.

Wm. D. Appel, President of the Association and Chief of the Textile Section, National Bureau of Standards, spoke briefly about the activities of the Association. He referred to the annual meeting which is planned for October 12, 13, and 14 at the Hotel Claridge, Atlantic City, and stated that the program is to be technical rather than social, in keeping with the times. Under the guidance of Kenneth Barnard, the Intersectional Contest will be a feature of the meeting.

Mr. Appel also referred to the Olney Medal, which has been endowed by the Howes Publishing Company. Members are urged to send nominations for candidates to the Olney Medal Committee of Award, care of the Secretary of the Association, in accordance with a recent announcement in the DYESTUFF REPORTER.

Mr. Appel pointed out that the work of the Research Committee has been outstanding and of benefit not only to the members, but to the industry and the public. Government specifications call for the use of A.A.T.C.C. standard test methods and the methods have been adopted widely by associations and laboratories. In order to maintain its position of leadership, increase its services to the members and, through them, to the industry in general, the Association is undertaking to strengthen its research activities. He referred to the report of the Executive Committee on Research of which Leonard Little is Chairman. This report was published in the February 14th issue.

The Association has done its work with little direct support from the industry. The support of corporate members is now needed to assure continuation and expansion of the research program. Each section is asked to try to increase corporate memberships to provide an income of $15.00 per member of the section.

In conclusion Mr. Appel described the Association as "a happy combination of the art and science of textile dyeing and finishing." "Our members," he said, "include those who know *how* and those who know *why*, working together to increase our knowledge and experience and sharing what we learn. Thus we become more valuable to ourselves and our employers. That is why our meetings and personal contacts are so important and why we continually seek more effective cooperation among members."

This section was fortunate to have as guest speaker for the evening, W. M. McLaurine, Secretary-Treasurer of American Cotton Mfg. Association. His subject was: "Crystal Gazing at the Post War World." He gave a very interesting talk on possibilities that may confront this country in post war planning.

Arthur R. Thompson, Jr., gave an entertaining performance of magic and sleight-of-hand.

As members of the Sectional Committee for 1944 there were elected, Walter E. Hadley, Standard-Coosa-Thatcher Co.; W. S. McNab, Quaker City Chemical Co.; F. L. Kibler, United Hosiery Mills; W. P. Clement, Kingsboro Silk Mills.

Respectfully submitted,
R. W. FREEZE, *Secretary.*

◆ ◆

CALENDAR OF COMING EVENTS

Meeting, New York Section, Downtown A. C., 19 West St., New York City, June 9, 1944. (Business Meeting).

Annual Outing, Philadelphia Section, Cedarbrook Country Club, June 16, 1944

Meeting, South Central Section, June 16, 1944 (Tentative).

Meeting, Southeastern Section, Callaway Institute, La Grange, Ga., September 9, 1944 (Tentative).

Annual Meeting, Hotel Claridge, Atlantic City, N. J., October 12, 13 and 14, 1944. Auspices of Philadelphia Section.

Outing, Rhode Island Section, Pawtucket Golf Course, Pawtucket, R. I., June 9, 1944. Golf tournament and Rhode Island Clambake. Dinner will be served only to those with paid reservations.

MEMBERSHIP
APPLICATION BLANKS
for individual
and corporate
MEMBERSHIP
may be obtained
from the secretary

Dr. H. C. CHAPIN
Lowell Textile Institute, Lowell, Mass.

THERMAL PROPERTIES OF MOIST FABRICS

CHARLES W. HOCK, ARNOLD M. SOOKNE and MILTON HARRIS[1]

ABSTRACT

The "chilling effect" or "clamminess," which moist fabrics produce when in contact with the body, was evaluated by subjective tests, by measurement of the drop in temperature which ensues when the moist fabrics are placed on an artificial "skin" surface, and by tests with a moisture-sensitive paper designed to measure the extent of contact which the fabrics made with a surface. Using fabrics of various fiber compositions and constructions, a good qualitative relation was found in these tests. Fabrics which produced considerable chilling in subjective tests were found to make good contact, and to cause a substantial drop in skin temperature. Conversely, fabrics which caused little or no clamminess made poor contact, and the accompanying drop in temperature was relatively small. The results of these experiments show clearly the progressive improvement of the fabrics with respect to chilling, as their wool content is increased, and also the superiority of certain types of construction which minimize the extent of contact of the fabrics with the skin.

I. INTRODUCTION

PRACTICAL experience has demonstrated that moist fabrics in contact with the body produce an unpleasant sensation commonly refered to as a "chilling effect" or a "clammy feel." The degree of the sensation varies with different fibers and fabrics; thus, on the basis of general experience, the merits of wool fabrics over similar cotton fabrics have long been recognized. This is one of the reasons, for example, for the preference usually given to woolen underwear and other garments for use in cold climates under conditions where physical labor causes considerable perspiration. It also accounts for the approval commonly expressed for woolen bathing suits.

In selecting fabrics for warmth, the thermal resistance is a factor of primary importance, and this property has been measured by many investigators [1, 2, 3, 4, 5, 6][2]. In general, the results indicate that for comparable thicknesses and densities there are no outstanding differences between different fabrics. The chilling effect noted above, however, has suggested that marked differences may be obtained as the amount of moisture contained in a fabric is appreciably increased, and accordingly an investigation was undertaken to evaluate this and other factors contributing to the phenomena of chilliness or clamminess in wet fabrics.

II. MATERIALS

Thirty-six samples of knit underwear fabric, prepared especially for experimental purposes, were used throughout the investigation. The fabrics consisted of plain and special knits of various weights and thicknesses and of different fiber compositions, as described in tables 1 and 2. Both unlaundered and twice-laundered samples were examined.

III. EXPERIMENTAL PROCEDURE

1. Subjective Tests

These tests were caried out in a room conditioned at 21.1°C and 65 per cent relative humidity. Three and one-half inch squares of the fabrics were soaked in water at the temperature of the conditioning room, and then dried in a towel until they contained the desired amount of water. The fabrics were tested when containing 100, 150, and 200 per cent moisture, based on their conditioned weights. All the fabrics were used in subjective tests, although each fabric was not tested with every other fabric because of the large number of tests that would be required. They were tested two at a time, on five male subjects, by simultaneously placing one fabric on the right and the other on the left arm (radical ulnar region of the forearm). The subject was then asked whether he detected a difference in chilling effect between the two arms, and if so, which fabric gave the greater sensation of chilling. Each fabric was left on the arm for 15 sec. and then removed, because it was found that the subject's immediate reaction appeared to be most reliable. Although some persons were able to perceive slight differences better than others, the subjective reactions of various individuals were in very good agreement.

2. Measurement of Drop in Surface Temperature

The apparatus used to determine the drop in surface temperature was essentially a constant temperature oil bath (fig. 1). In order to provide conditions under which a substantial drop in "skin" temperature could be measured, the heated surface was covered with several layers of asbestos sheeting and a layer of waterproof rubberized cloth, the total thickness of this cover being approximately 3/16 inch. The "skin" temperature was measured by four copper-constantan thermocouples, symmetrically placed on the outer side of the rubberized cloth, and held in position by a thin layer of cellulose nitrate cement. The thermocouples were connected in series, and the ice point was used as the reference temperature. A switch arrangement made it possible to measure with a potentiometer each individual electromotive force, as well as the sum of the four individual values. The average "skin" temperature was calculated from one-fourth of the value of the potential difference of the four units in series. To insure a highly constant skin temperature, the heating apparatus was placed in a small conditioning cabinet, which in turn was placed in a room maintained at 21.1°C and 65 per cent relative humidity. Water at room temperature is circulated through the radiator, K; the fan, M, blows air at room temperature first over the radiator and then over the heating apparatus. Since the water in the radiator does not respond to the

[1] Research Associates at the National Bureau of Standards, representing the Textile Foundation.

[2] Figures in brackets indicate the literature references at the end of the paper.

TABLE 1
Description of Fabrics

Code	*Type of Spinning*	*Type of knitting*	*Fiber content of yarn*	*Nominal wt. of undershirts, 1 doz. size 40 (unlaundered) lbs.*
A	Cotton	Rib	100% cotton	10½
B	Cotton	Rib	75% cotton—25% wool	10½
C	French	Rib	50% cotton—50% wool	10½
D	French	Rib	50% cotton—50% wool	10½
E	French	Rib	25% cotton—75% wool	10½
F	French	Rib	100% wool	10½
G	Cotton	Rib	100% cotton	8 to 8¼
H	Cotton	Rib	75% cotton—25% wool	8 to 8¼
I	French	Rib	50% cotton—50% wool	8 to 8¼
K	French	Rib	25% cotton—75% wool	8 to 8¼
L	French	Rib	100% wool	8 to 8¼
M	Cotton	Rib	100% cotton	5½ to 6
N	Cotton	Rib	75% cotton—25% wool	5½ to 6
O	French	Rib	50% cotton—50% wool	5½ to 6
Q	French	Rib	25% cotton—75% wool	5½ to 6
R	French	Rib	100% wool	5½ to 6
CA	French	Mesh stitch	50% cotton—50% wool	8 to 8¼
CB	French	Mesh stitch	50% cotton—50% wool	5½ to 6
CC	French	Waffle stitch	50% cotton—50% wool	10½
CD	Filament	Rib	100% acetate filament	Light[a]
CE	Filament	Rib	100% viscose rayon filament	Light[a]
CF	Filament	Rib	100% nylon filament	Light[a]
FC	French	Flat	50% cotton—50% wool	10½
FI	French	Flat	50% cotton—50% wool	8 to 8¼
FM	Cotton	Flat	100% cotton	5½ to 6
FO	French	Flat	50% cotton—50% wool	5½ to 6
XA	French	Shaker stitch	50% cotton—50% wool	10½
XB	Cotton & French	Duofold type	100% cotton in—100% wool out	10½
XC	Cotton & French	Duofold type	100% cotton out—100% wool in	10½
XD	French	Interlock	50% cotton—50% wool	8 to 8¼
XE	French	Terry stitch	50% cotton—50% wool	10½
XF	Cotton	Alternate rib feed	75% cotton—25% wool	10½
XG	Cotton	Rib	50% cotton—50% wool	8 to 8¼
XH	Cotton	Flat fleece lined	100% cotton	10½
XI	Woolen	Rib	100% wool	10½
XJ	Cotton	Raschel	100% cotton	10½

relatively short-period temperature fluctuations of the air in the room, the temperature within the cabinet is considerably more constant than that in the room. Using this device, the average temperature of the "skin" surface was constant to ± 0.1°C. The internal temperature of the bath was held at 50.0°C ± 0.05°C, and the average corresponding "skin" temperature was 37.5°C[3].

The experimental procedure consisted of first measuring the "skin" temperature when the apparatus, without a test fabric on it, was in equilibrium with its surroundings. Subsequently, a moist fabric was placed on the apparatus. The moist fabrics were prepared by soaking approximately 3.5 in. by 6 in. samples in distilled water, the temperature of which was the same as that of the conditioning room, and then pressing the samples gently between towels until they contained 150 per cent of moisture based on the weight of the conditioned cloth. The moist fabric was placed on the apparatus so as to cover the thermocouples, and covered immediately with a cheesecloth belt (approximately 4 in. wide) weighted at both ends (0.3 lb per end) in order to hold the sample in close contact with the heated surface. The change in surface temperature was followed as a function of time, the first reading being made 30 seconds after the initial contact of the moist fabric with the heated surface. Observations were made for 10 minutes and then discontinued because it was found that further changes in temperature occurred only very slowly.

3. "Contact" Tests

Since it is reasonable to expect that the chilling effect of wet fabrics may be related to the extent of contact which they make with the skin, a method was devised to check this hypothesis. A moisture-sensitive paper was prepared by impregnating a soft paper[4] with a water-soluble dye of high tinctorial power,[5] according to the following procedure. A mixture consisting of 5 g dye, 30 g crude milled rubber, and 1 liter Stoddard's solvent, was prepared by first dissolving the rubber in the solvent, and then grinding together the dye and rubber solution in a mortar.

[3] Since a set-up that would discriminate between fabrics with fairly similar thermal properties was required, the drop in skin temperature was accentuated by using a relatively hot skin (37.5°C.) and a thick layer of insulation. The good correlation of these measurements with subjective tests demonstrates the validity of this procedure for the purpose of evaluating the fabrics.

[4] The paper was a soft sheet made from wood pulp (No. 1 alpha), containing a small amount of rosin size (sizing value by the dry indicator method: 28 sec), basis weight 23-24 lbs, 17 x 22 in.—500 sheets.

[5] The dye was basic fuchsine (duPont fuchsine concentrated powder, L7596).

TABLE 2
Properties of Twice-Laundered Fabrics

Code	*Wt. of fabrics oz/yd.*[a]	*Thickness of fabrics at pressure of 0.1 lb/in² in.*	*Air permeability*[b] *ft³/(min x ft²) at pressure drop of 0.5 in. H_2O*	*Thermal*[d] *transmission Btu/(°F x hr x ft²)*
A	11.4	0.063	86	1.24
B	12.3	.073	82	1.24
C	12.0	.078	85	1.20
D	10.8	.066	126	1.25
E	11.7	.070	137	1.24
F	9.8	.076	197	1.18
G	9.8	.061	101	1.30
H	9.7	.072	109	1.20
I	10.9	.077	94	1.20
K	9.5	.073	195	1.26
L	9.9	.067	215	1.20
M	6.0	.048	180	1.33
N	6.3	.055	193	1.26
O	6.2	.054	239	1.25
Q	6.4	.057	268	1.24
R	7.0	.080	310	1.15
CA	8.3	.068	238	1.32
CB	4.9	.055	390	1.32
CC	13.0	.108	144	1.23
CD	3.6	.023	249[c]	1.48
CE	4.2	.028	242[c]	1.48
CF	5.5	.032	106[c]	1.42
FC	9.1	.060	102	1.26
FI	6.9	.044	195	1.33
FM	5.7	.045	189	1.34
FO	5.4	.040	256	1.33
XA	9.9	.070	164	1.22
XB	10.7	.095	178	1.16
XC	10.9	.091	162	1.07[e]
XD	10.4	.072	99	1.24
XE	10.4	.097	116	1.12
XF	10.7	.077	106	1.24
XG	9.8	.074	121	1.29
XH	8.9	.115	81	1.04
XI	9.0	.089	204	1.18
XJ	8.2	.075	504	1.31

[a] The nominal weights of these fabrics in lbs per doz. undershirts of size 40 was not given. Their actual weights in oz/yd² are as follows: CD—3.4, CE—4.2, CF—5.4.

[b] Measured with the instrument described by Schiefer and Boyland [7].

[c] The values for the air permeability of samples CD, CE, and CF are for a pressure difference across the fabric of 0.05 inch of water, not 0.5 inch as used for all other samples. The air permeability of these samples was too high to measure at 0.5 inch pressure difference.

[d] Measured with the instrument described by Cleveland [8].

[e] With sample XC, a duofold fabric, the test was first carried out with the wool layer inside (i.e., against the heating plate of the apparatus) and then with the cotton layer inside. The results were 1.07 and 1.14, respectively.

To insure uniformity of distribution, the mixture was subsequently placed on a mechanical shaker for half an hour. The dye is insoluble in the organic solvent and does not appear red under these conditions; the rubber aids in dispersing the dye and imparts to the finished paper certain desirable properties. Strips of the paper were dipped in the impregnating mixture and hung up to dry at room temperature. The last traces of solvent were removed from the papers by placing them in a vacuum oven at 65°C for 15-20 min. After trimming to the desired size, the papers were ready for use.

The test for contact was carried out by placing pieces of the wet fabrics, 3½ inches square, on the papers for 10 min., under a pressure of 0.5 lb. per square inch. A piece of the sensitized paper was first laid on a dry glass surface. The wet fabric was then placed on top of the paper, and covered with a glass square of similar size, and weights to bring the pressure to the stated amount. After 10 minutes the fabrics and weights were removed. The papers, which were practically colorless originally, became red where the moist fabrics touched them, thereby indicating the extent of contact of the fabrics[6]. Photometric measurements of the reflectance of the papers were subsequently made, thus making it possible to assign to each fabric a numerical value indicative of its contact at any given moisture content. The measurements were made by means of a Martens photometer using a filter isolating the 560 millimicron line.

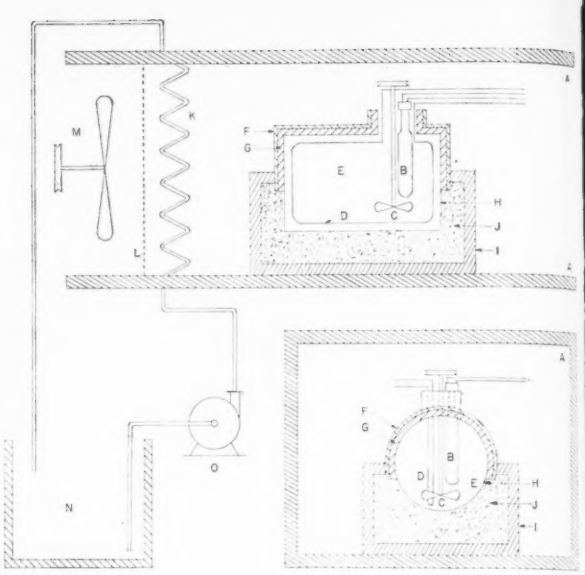


FIGURE 1. Diagram of apparatus for measuring drop in "skin" temperature. Upper and left portions, schematic side view; lower right, cross section. (A) Outer box, (B) Thermoregulator, (C) Mechanical stirrer, (D) Heater, (E) Oil, (F) Rubberized fabric, (G) Asbestos, (H) Metal container, (I) Wooden box, (J) Insulation, (K) Radiator, (L) Cheesecloth, (M) Fan, (N) Water tank, (O) Pump.

IV. RESULTS AND DISCUSSION

1. Qualitative Relations Between Subjective and Objective Tests

This investigation was undertaken not to develop a standard technique for evaluating the chilling properties of fabrics, but rather to develop a method for studying a phenomenon which has been observed empirically for a long time. Owing to the many complex factors which contribute to this phenomenon, an attempt will not be made to present the data on a quantitative basis. It is recognized, furthermore, that only one aspect of the larger problem of the thermal properties of fabrics has been studied. Never-

[6] This test does not actually measure the contact which the fabrics make with the human skin, but for the purposes of the present investigation, the test is believed to be an adequate indirect measure of this property.

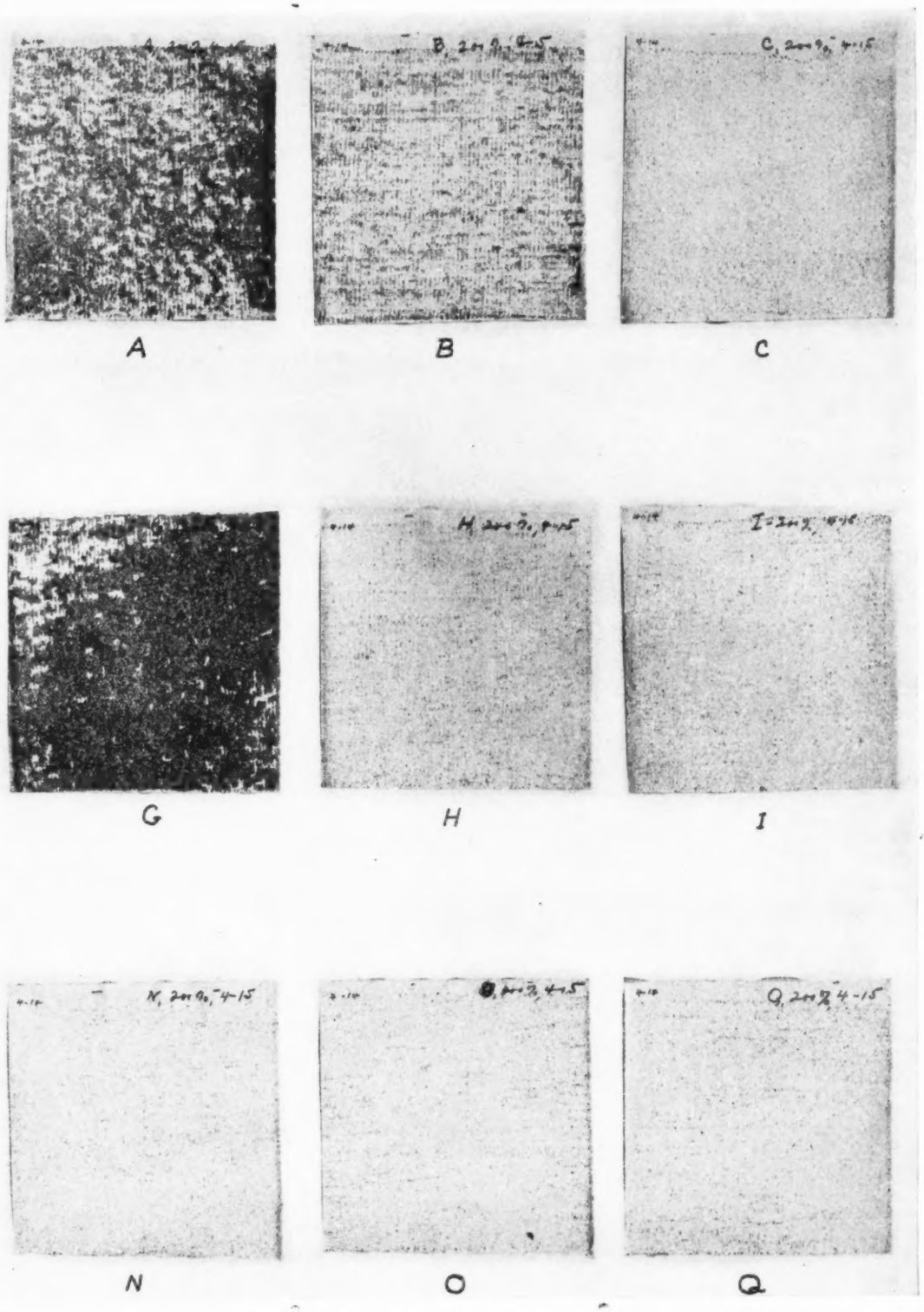


FIGURE 2. Photograph of "contact" papers obtained with fabrics containing 200 per cent moisture.

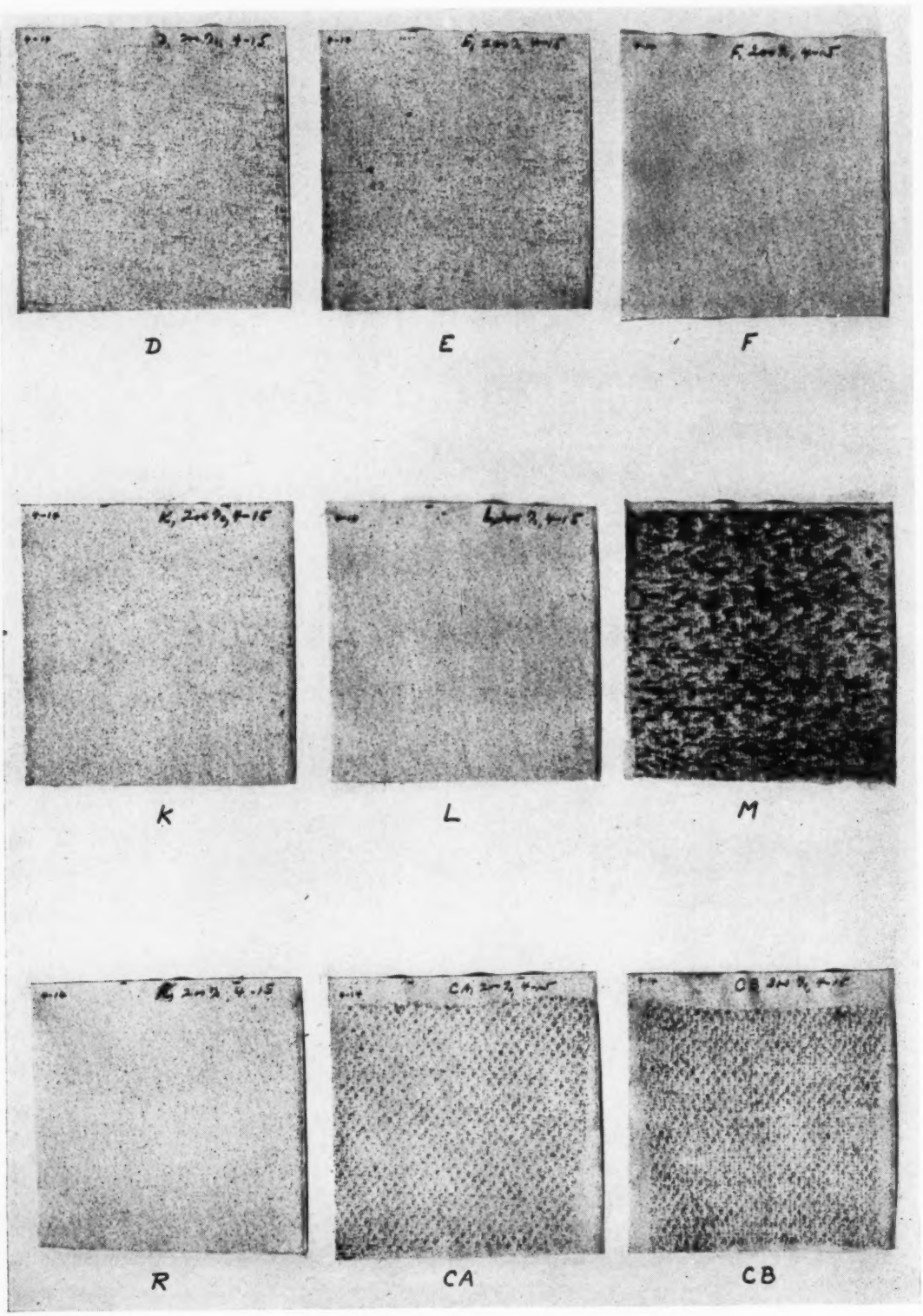


FIGURE 3. Photograph of "contact" papers obtained with fabrics containing 200 per cent moisture.

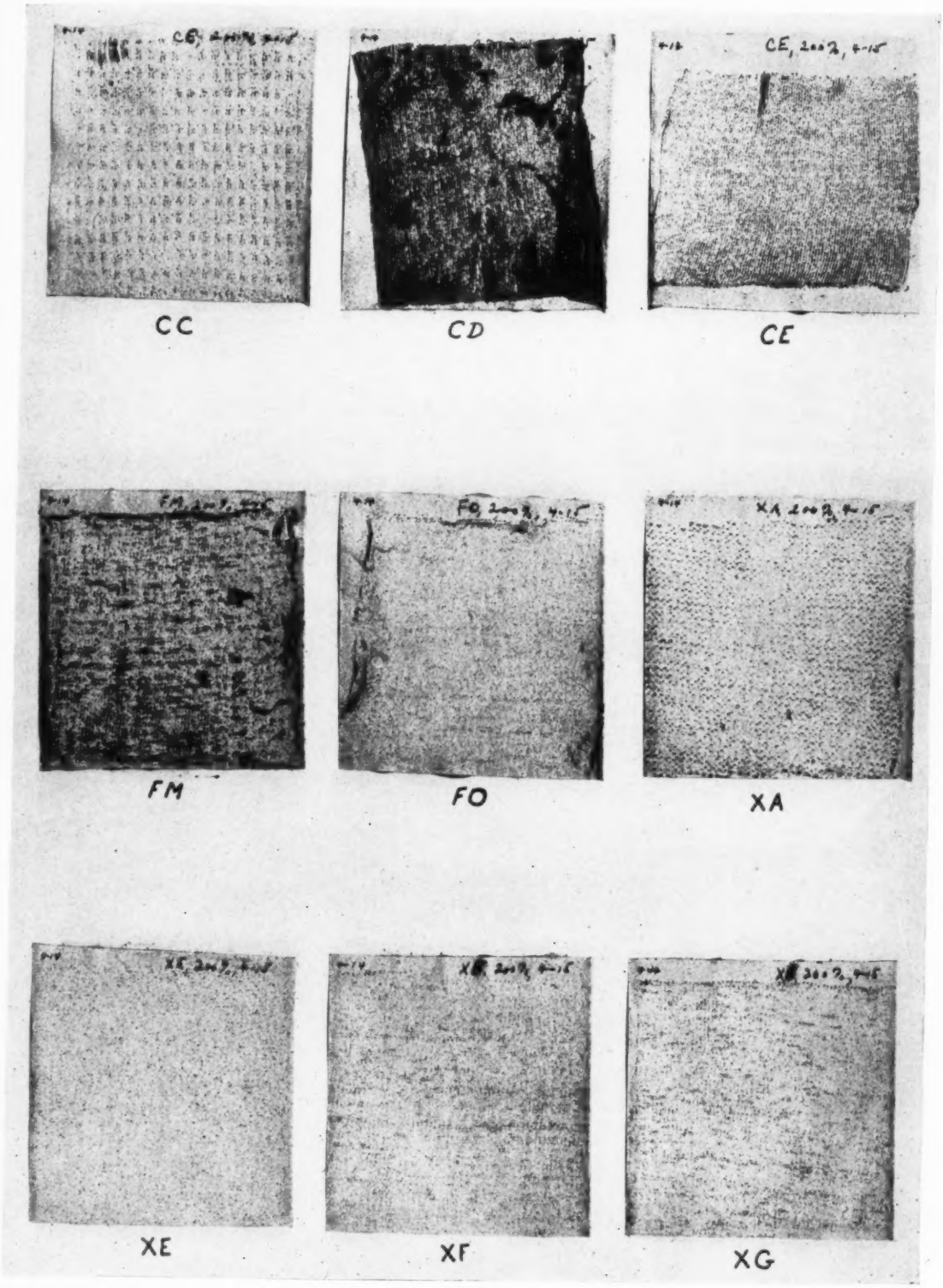
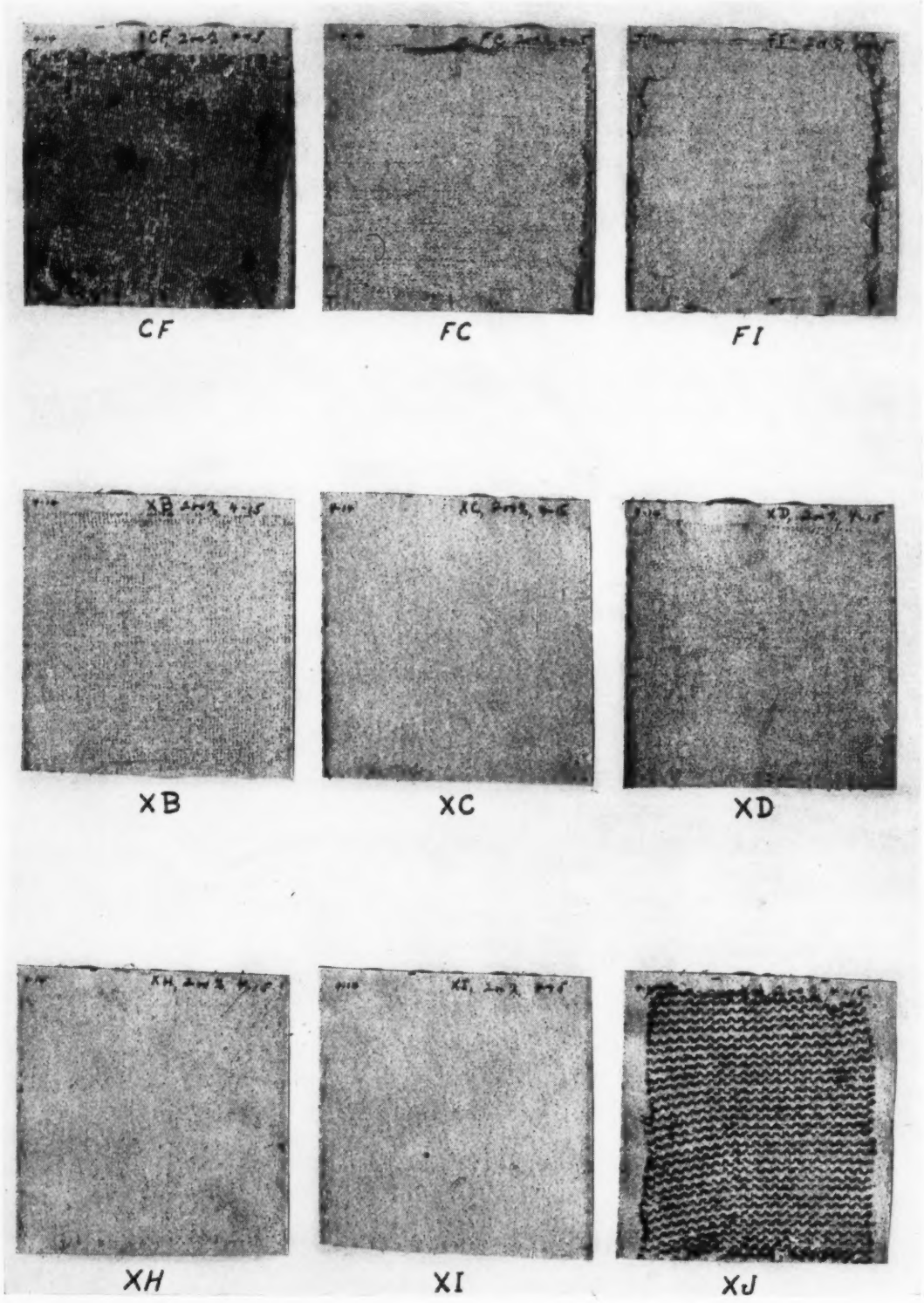


FIGURE 4. Photograph of "contact" papers obtained with fabrics containing 200 per cent moisture.



E 5. Photograph of "contact" papers obtained with fabrics containing 200 per cent moisture.

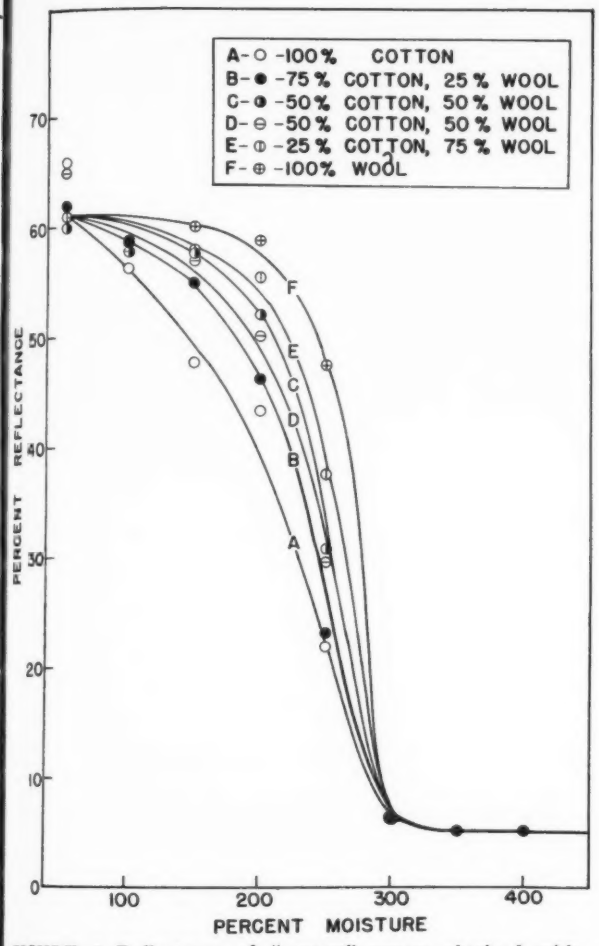


FIGURE 6. Reflectance of "contact" papers obtained with fabrics containing various percentages of moisture. 10½ lb. fabrics composed of various percentages of cotton and wool.

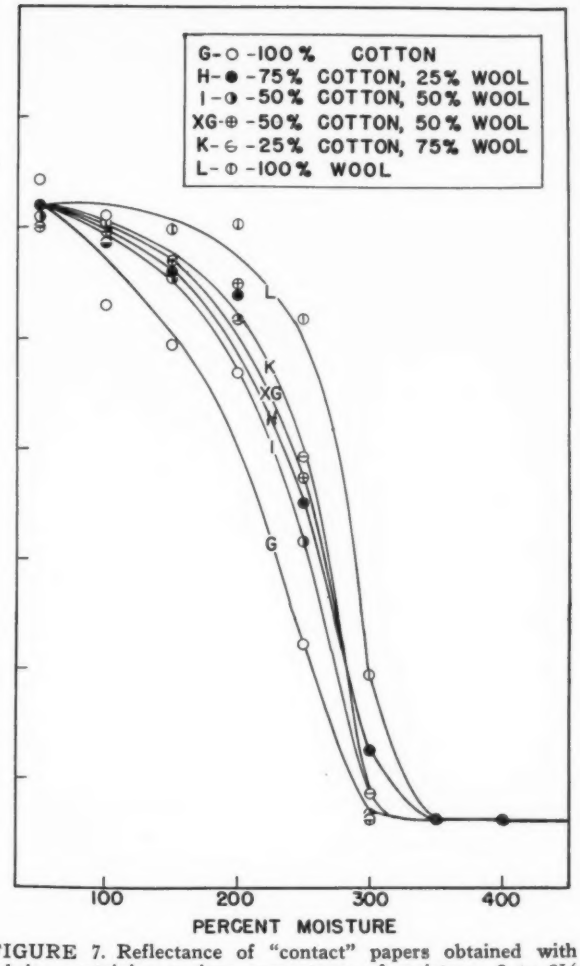


FIGURE 7. Reflectance of "contact" papers obtained with fabrics containing various percentages of moisture. 8 to 8¼ lb. fabrics composed of various percentages of cotton and wool.

TABLE 3

Subjective Results Obtained With Fabrics Containing 200 Per Cent Moisture on the Basis of Their Conditioned Weights

Samples compared	*Subjective reaction*
A and F	A much colder
M and O	M much colder
N and R	Neither produces much chill, but N slightly colder
Q and FO	Neither causes much chilling, but FO slightly colder
G and L	G much colder
H and K	Both rather cool, H slightly cooler than K
I and FI	FI slightly colder
A and E	A much colder
B and D	B colder
C and XD	No difference noted
XF and XG ...	Both produce some chilling, but XF slightly colder
F and XI	F somewhat colder
CE and CF ...	CF slightly colder
CE and CD ...	Both cold, CD colder
XB and XC ...	XB cold, XC warm feel
FO and FI	No difference
FM and FC ...	FM colder
XJ and XA ...	Both cold, but XJ colder
CB and CA ...	Very little difference, but CA may be slightly colder
CC and CD ..	CD much colder
XE and XH ..	Both comfortable, but XE very slightly colder

theless, several significant relationships were noted, and these will be discussed in more or less general terms, making no effort to account for small differences between the many and diverse fabrics included in the investigation.

The results of the subjective tests were in very good agreement with the direct measurements of drop in temperature, and degree of contact. The results of a typical set of subjective experiments are given in table 3, and may be compared with the corresponding objective measurements of figures 2 to 21. When, as for example with sample A, the subject experienced pronounced chilling, a substantial drop in temperature was measured, and the fabric was found to make good contact with the skin. On the other hand, a smaller drop in temperature was measured, and poor contact was observed in fabrics such as sample F, which did not produce a sensation of chilling to the subject. This correlation between subjective reaction and contact was especially interesting when the fabrics were placed on the moisture-sensitive papers, immediately after their removal from the arm. Invariably, when the subjects experienced pronounced differences in comfort, simi-

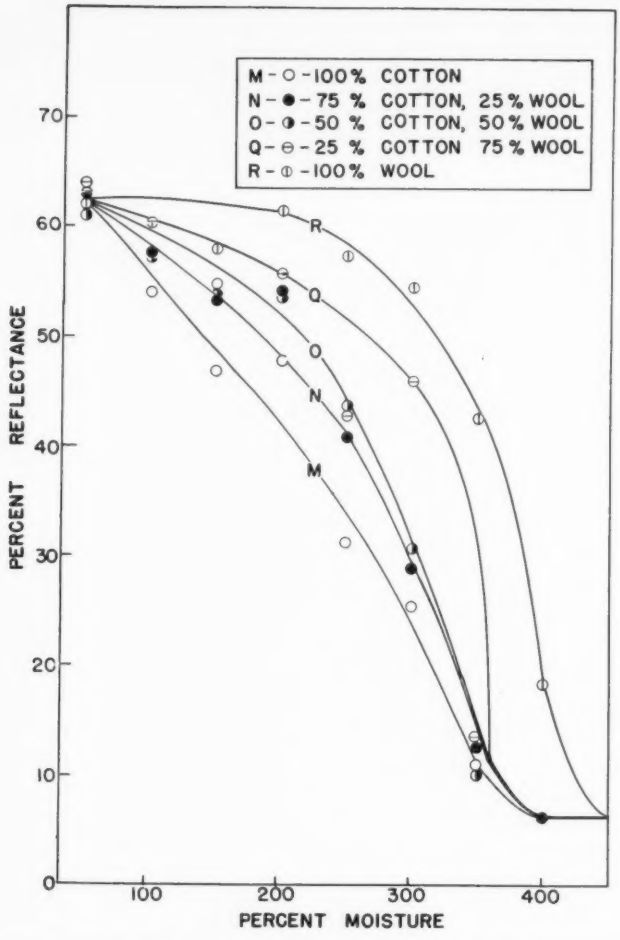


FIGURE 8. Reflectance of "contact" papers obtained with fabrics containing various percentages of moisture. 5½ to 6 lb. fabrics composed of various percentages of cotton and wool.

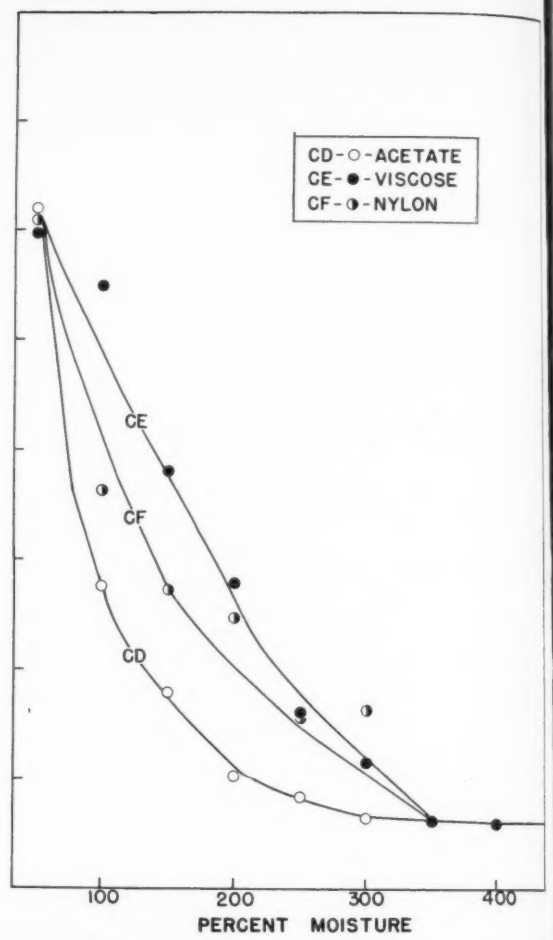


FIGURE 9. Reflectance of "contact" papers obtained with fabrics containing various percentages of moisture. Lightweight fabrics made of continuous filament acetate, viscose, and nylon.

lar outstanding differences in contact were observed. Likewise, when the individuals perceived little or no difference in chilling effect, the sensitized papers showed that the two fabrics made similar contact. A typical series of contact papers, obtained when the fabrics contained 200 per cent moisture, is shown in figures 2 to 5. It is clear that, although all the fabrics contained equal percentages of water, some made much more contact with the papers than others. Thus, for example, samples A, G, M, FM and XJ made very good contact, whereas others such as, F, L, R, XC and XI made poor contact. By increasing and decreasing the amount of water present in the fabrics their "tolerance" to moisture was estimated. It was found that even at 450 per cent moisture some of the fabrics (L, CB, XE and XH) still did not completely color the papers. On the other hand, at 50 per cent moisture only fabrics A, B, G, M, FM and XJ colored the papers at all, and then only lightly. This variation in contact is shown graphically in figures 6 to 13 where the reflectance of the papers as measured photometrically, is plotted against per cent of moisture in the fabrics.

To facilitate a more detailed discussion, the fabrics may be grouped according to weight, construction, and fiber composition.

2. Influence of Fiber Content on Chilling Effect

Figures 14 to 17 show the drop in temperature caused by laundered fabrics of comparable weight and construction, but of different fiber compositions. The curves show a rapid initial drop in surface temperature[7] during the first 30 seconds of the measurements, usually followed by a slight increase in temperature, after which an approximately steady state is reached.

Since the thermocouple readings are influenced by the underside of the moist fabric as well as by the "skin," the readings do not correspond precisely to the "skin" temperatures. This fact probably accounts in large measure

[7] In the course of measurements on the transmission of heat through textile fabrics, Rees [5] observed a very small drop in temperature when fabrics conditioned at 25°C. and 65 per cent relative humidity were brought in contact with a hot plate. The magnitude of the drop was greater for cotton than for woolen fabrics.

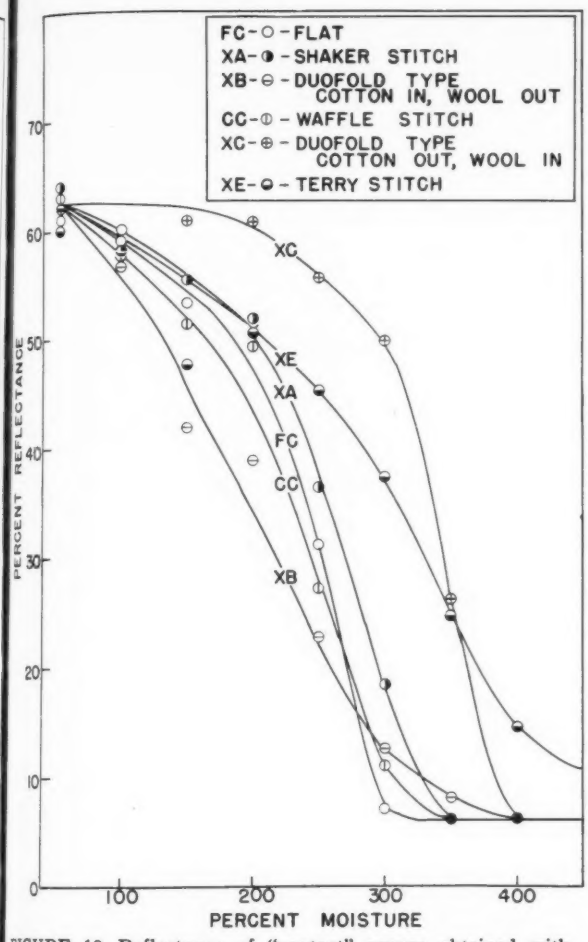


FIGURE 10. Reflectance of "contact" papers obtained with fabrics containing various percentages of moisture. 10½ lb. fabrics of different constructions, composed of 50 per cent cotton and 50 per cent wool.

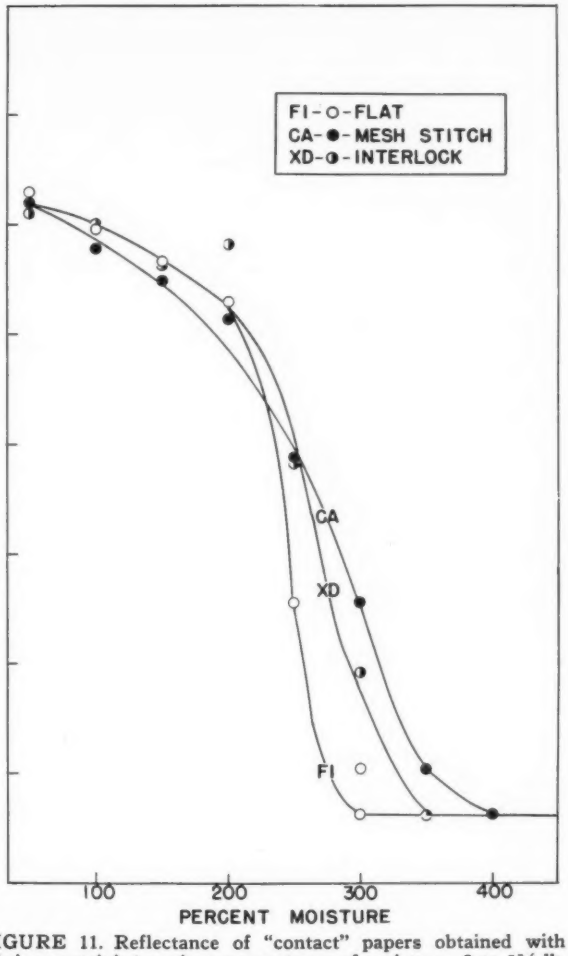


FIGURE 11. Reflectance of "contact" papers obtained with fabrics containing various percentages of moisture. 8 to 8¼ lb. fabrics of different constructions, composed of 50 per cent cotton and 50 per cent wool.

for the unusual shape of the curves in the early portion of the measurements. Thus, the rapid initial drop in temperature caused by the contact of the moist sample is followed by a rise in temperature, corresponding to an interval in which the heat supplied exceeds the heat lost by evaporation. When the loss of heat by evaporation becomes sufficiently great, a decrease in the thermocouple temperature again ensues. The heavier fabrics, because of their higher heat capacity and greater (absolute) content of water, causes a larger initial drop in "skin" temperature (compare figures 14 through 17). On the other hand, a longer time is required for the evaporative losses to exceed the heat supplied in the case of the heavier samples.

In general the results of figure 14 show a regular, progressive decrease in chilling effect of 10½ lb[8] fabrics with increase in their wool content. Similar results for samples of nominal weights of 8 to 8¼ lbs and 5½ to 6 lbs are shown in figures 15 and 16, respectively. Sample R (figure 16), which showed the smallest decrease in temperature of all the rib knit samples, was characterized by a very fuzzy surface after fabrics laundering and was considerably thicker than other fabrics of comparable weight. Comparison of the curves showing drop in surface temperature (figures 14, 15 and 16) with those showing reflectance[9] of the contact papers (figures 6, 7 and 8) reveal a good qualitative relation between these two sets of measurements.

Figures 9 and 17 show the reflectance of contact papers and the drop in temperature, respectively, of lightweight continuous filament underwear samples. These fabrics cause a big drop in temperature, but differences between the acetate, viscose, and nylon fabrics are not large, and are of questionable significance. The difficulty in manipulating these very thin fabrics in the various tests may account in part for the low correlation of the contact and temperature measurements.

[8] The nominal weight of these fabrics is 10½ lbs. per dozen suits of size 40. For brevity they will henceforth be designated "10½ lb. fabrics," and a similar designation will be used for fabrics of other nominal weights. Although nominally the same, the fabrics differ appreciably in actual weight, as shown in table 1.

[9] The more color produced on the papers as a result of contact with the wet fabrics, the lower is their reflectance.

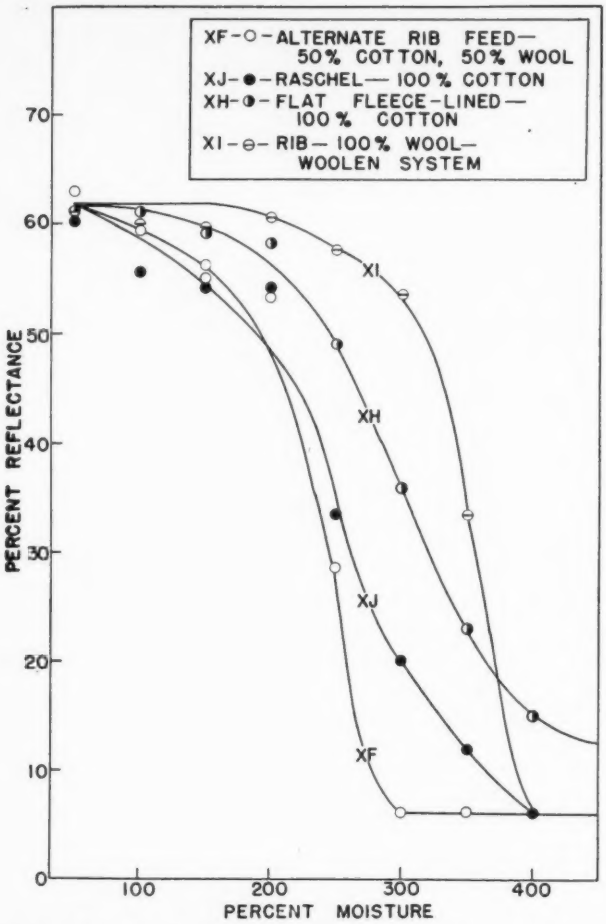


FIGURE 12. Reflectance of "contact" papers obtained with fabrics containing various percentages of moisture. 10½ lb. fabrics of different constructions and various fiber compositions.

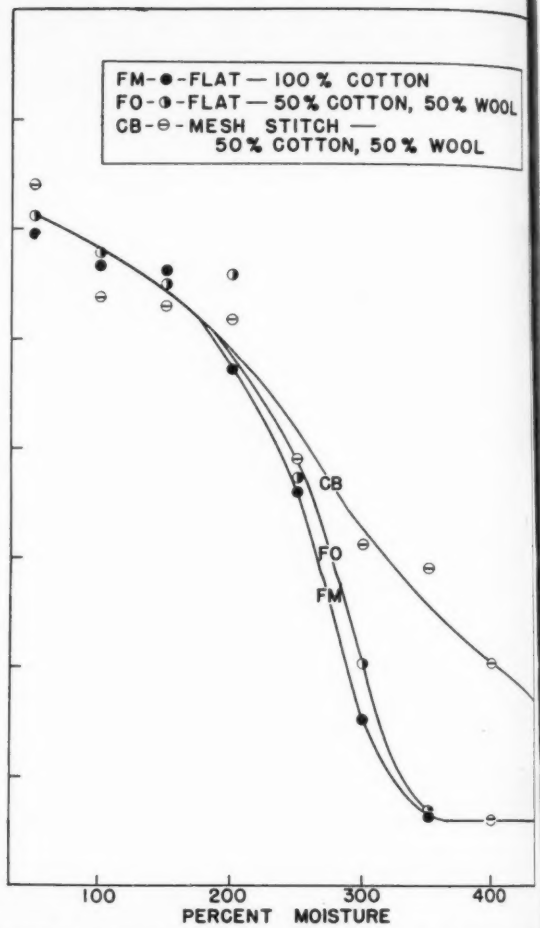


FIGURE 13. Reflectance of "contact" papers obtained with fabrics containing various percentages of moisture. 5½ to 6 lb. fabrics of different constructions and various fiber compositions.

3. Influence of Construction on Chilling Effect

Figures 18 and 19 show curves of the drop in temperature obtained with fabrics of varied knit but of the same fiber content (50% cotton—50% wool). The curves of rib knit fabrics (sample C and I) are included for comparison. Because of the complexity introduced by fabrics of different constructions the apparent relation between drop in temperature (figures 18 and 19) and extent of contact (figures 10 and 11) is not so close as with fabrics of simple rib knit. However, fabrics XE and XC (terry stitch and duofold[10] with wool inside, respectively) appear to be superior to the conventional rib knit. Since the duofold fabrics are identical except that one has cotton and the other wool on the inside, a comparison of the results for these two samples clearly shows the advantage of having wool next to the skin rather than cotton. Although fabrics which are superior at one moisture percentage are usually superior at another also, this is not always the case, as is shown by crossing of the reflectance curves.

[10]The duofold fabrics consist of two layers, one all cotton and the other all wool.

Figures 20 and 21 show the drop in temperature for two groups of fabrics of various constructions and fiber compositions. Figures 12 and 13 indicate the contact made by the same fabrics. The results of the two sets of measurements show a good qualitative relation, the fabrics causing the least drop in temperature being the ones which make the poorest contact. Sample XI, which is an all-wool fabric spun on the woolen system, is among the best of all fabrics tested. The marked improvement that a fleece lining makes in an all-cotton fabric is illustrated by the curve for XH.

Throughout the investigation the moisture content of the samples was calculated on a percentage basis. If the fabrics had been tested with a given moisture content per unit area, the relative merits of the various fabrics may have been somewhat changed. It is believed, however, that a similar basic relation between subjective tests, direct measurements of drop in temperature, and extent of contact, would still have been found.

V. CONCLUSION

Although it is difficult to rate on an absolute basis the "chilling effect" produced by the diverse fabrics which were

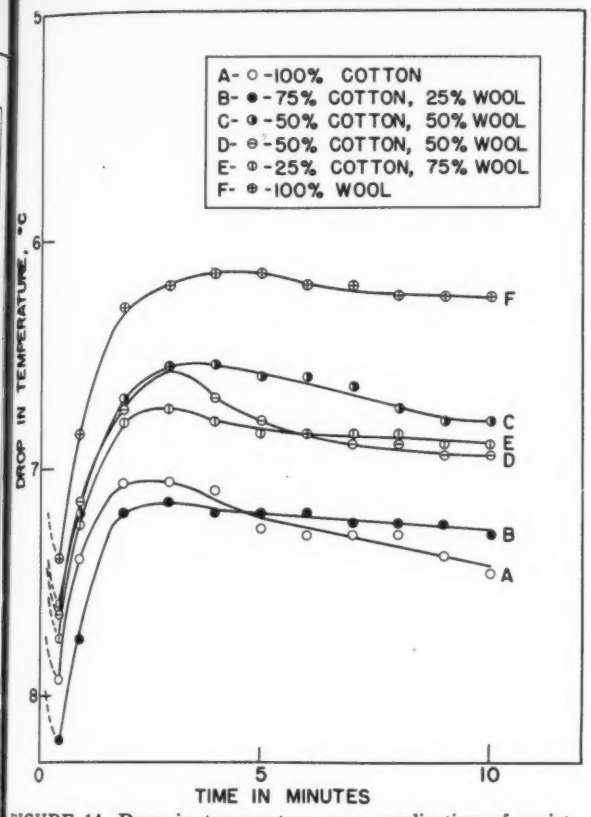

A- ○ -100% COTTON
B- ● -75% COTTON, 25% WOOL
C- ◑ -50% COTTON, 50% WOOL
D- ⊖ -50% COTTON, 50% WOOL
E- ⊕ -25% COTTON, 75% WOOL
F- ⊕ -100% WOOL
DROP IN TEMPERATURE, °C
TIME IN MINUTES

FIGURE 14. Drop in temperature upon application of moist fabrics to heated "skin" surface. 10½ lb. fabrics composed of various percentages of cotton and wool.

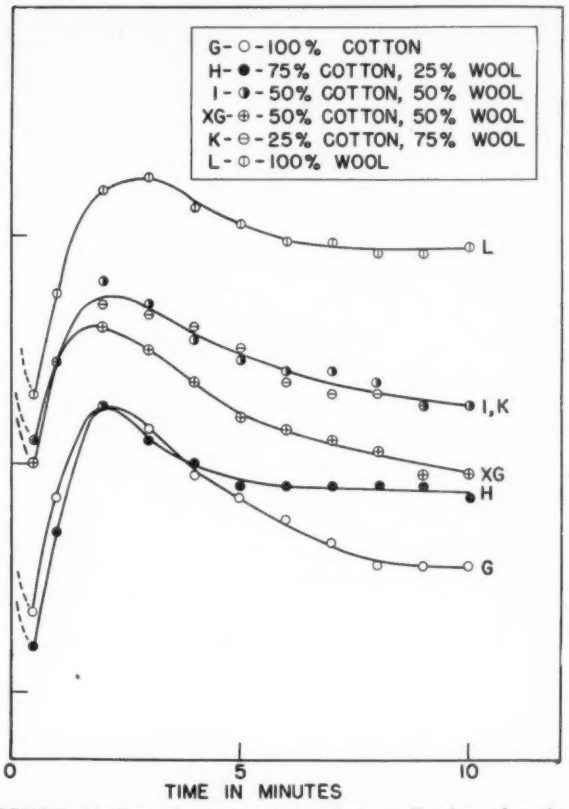


FIGURE 15. Drop in temperature upon application of moist fabrics to heated "skin" surface. 8 to 8¼ lb. fabrics composed of various percentages of cotton and wool.

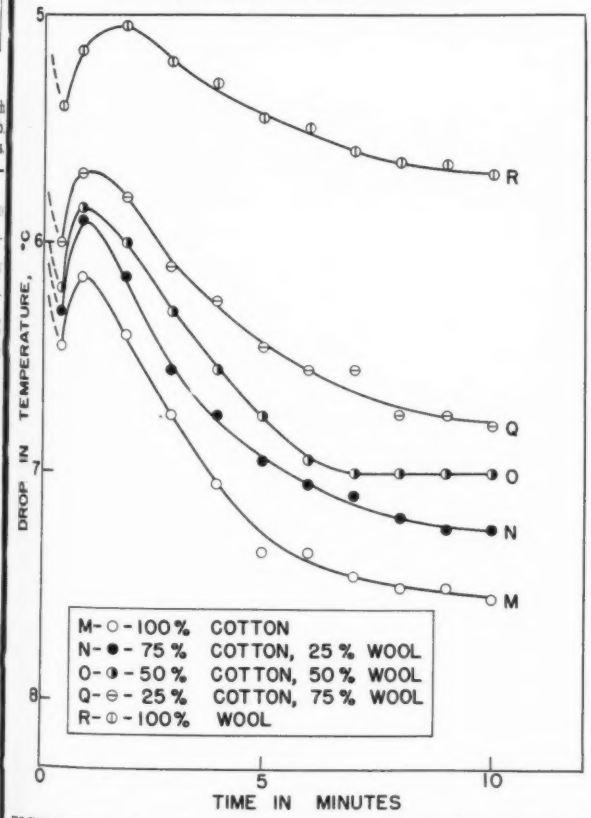


FIGURE 16. Drop in temperature upon application of moist fabrics to heated "skin" surface. 5½ to 6 lb. fabrics composed of various percentages of cotton and wool.

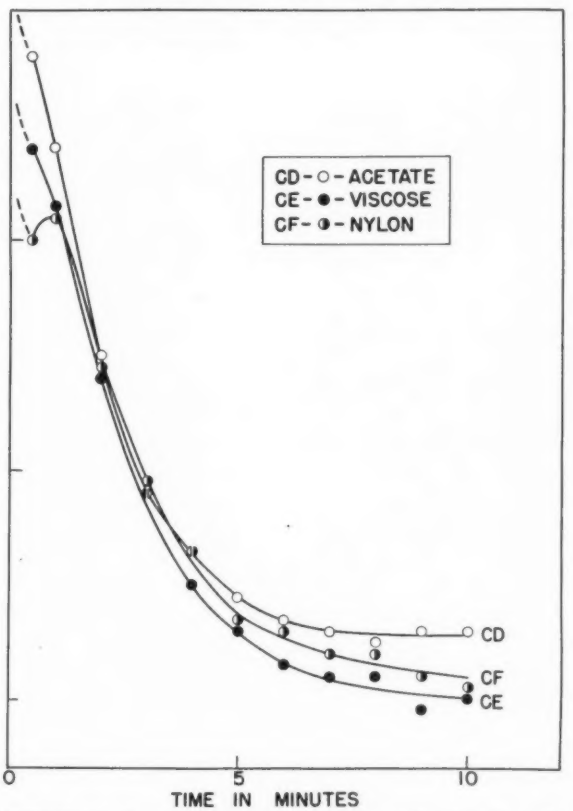


FIGURE 17. Drop in temperature upon application of moist fabrics to heated "skin" surface. Lightweight fabrics made of continuous filament acetate, viscose, and nylon.

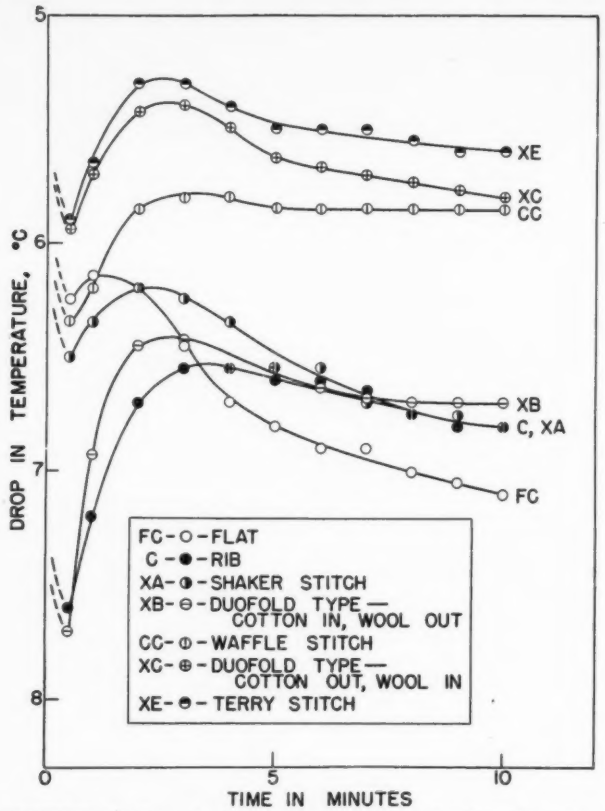


FIGURE 18. Drop in temperature upon application of moist fabrics to heated "skin" surface. 10½ lb. fabrics of different constructions, composed of 50 per cent cotton and 50 per cent wool.

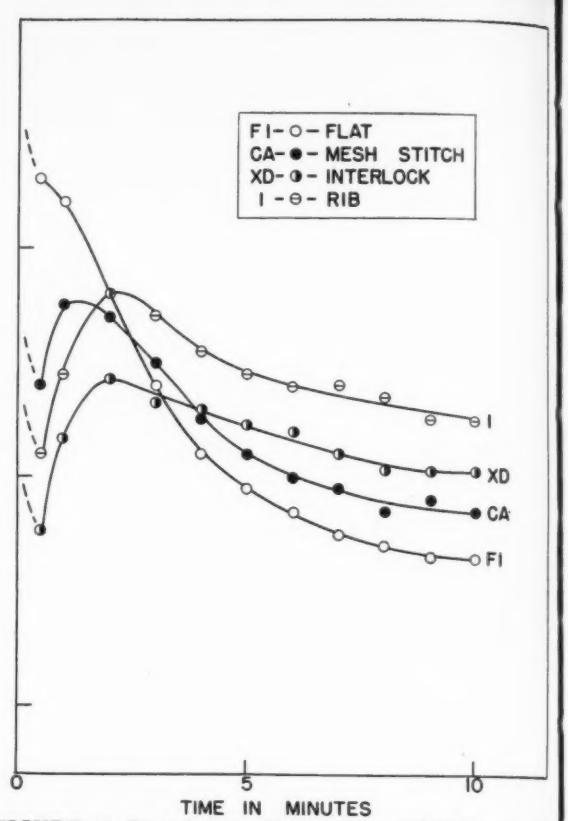


FIGURE 19. Drop in temperature upon application of moist fabrics to heated "skin" surface. 8 to 8¼ lb. fabrics of different constructions, composed of 50 per cent cotton and 50 per cent wool.

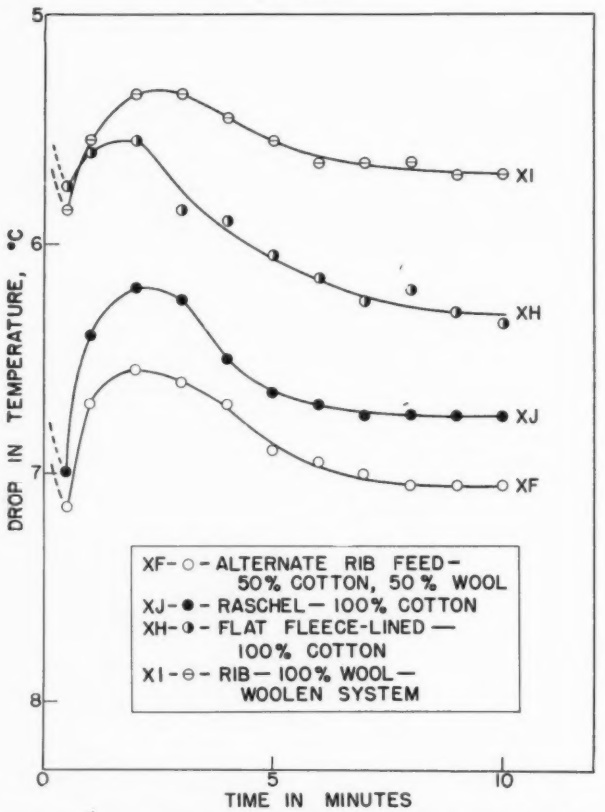


FIGURE 20. Drop in temperature upon application of moist fabrics to heated "skin" surface. 10½ lb. fabrics of different constructions and various fiber compositions.

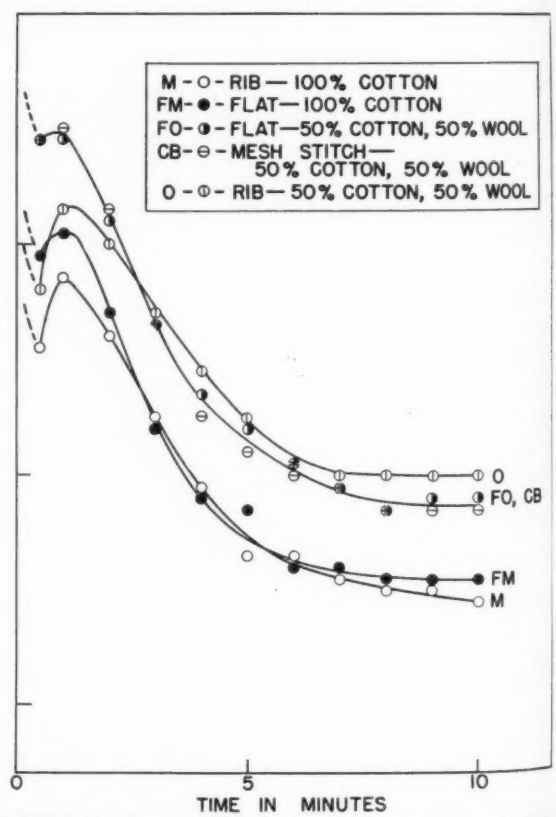


FIGURE 21. Drop in temperature upon application of moist fabrics to heated "skin" surface. 5½ to 6 lb. fabrics of different constructions and various fiber compositions.

included in these tests, several important conclusions can nevertheless be drawn. Thus, a progressive improvement of the fabrics as their wool content is increased and the superiority of certain types of construction are clearly indicated. The extent of contact which the fabrics make with the skin appears to be the significant factor, tests showing that those fabrics which make the poorest contact cause the least chilling. From this point of view, the desirability of wool fibers which are highly crimped and possess long range elasticity, properties which permit a type of fabric construction which minimizes the extent of contact which can be made with the skin, is apparent. In contrast, cotton which exhibits considerable plasticity when wet is less desirable from the same point of view. However, the results show that special types of construction, especially those which produce a napped or fuzzy surface reduce appreciably the contact which even wet cotton fabrics make and thereby lessen the chilling effect. It appears, therefore, that in selecting fabrics for warmth, especially when these fabrics are to be worn next to the skin in cold climates under conditions where considerable perspiration is produced, consideration should be given to the type of contact which they make with the body[11].

ACKNOWLEDGMENT

The data in table 2 were made available through the kindness of W. D. Appel, Chief of the Textile Section, National Bureau of Standards.

IV. REFERENCES

[1] J. B. Speakman and N. H. Chamberlain, J. Textile Inst. 21, T29 (1930).
[2] M. C. Marsh, J. Textile Inst. 22, T245 (1931).
[3] C. P. Black and J. A. Matthew, J. Textile Inst. 25, T197 (1934).
[4] C. D. Niven and J. D. Babbitt, J. Textile Inst. 29, T161 (1938).
[5] H. Rees, J. Textile Inst. 32, T149 (1941).
[6] H. F. Schiefer, L. R. Mizell and F. T. Mosedale, J. Research NBS 30, 203 (1943) RP1528.
[7] H. F. Schiefer and P. Boyland, J. Research NBS 28, 637 (1942) RP1471.
[8] R. S. Cleveland, J. Research NBS 19, 675 (1937) RP1055.

[11] It is suggested that the type of contact may also be a factor in selecting fabrics for garments to be worn in hot climates where keeping the body cool is a primary consideration. Preliminary evidence is available which indicates that for hot, humid regions, thin flat fabrics are highly desirable.

—♦ ♦—

REMOVING CAUSTIC WITH BICARBONATE OF SODA

A. L. DUBEAU and H. R. DINGES

The Mathieson Alkali Works, Inc.

IT was indicated, some months ago, that a new process* using sodium bicarbonate for the removal of residual caustic soda from goods after boiling out, offered certain advantages over the acid treatment following jig scouring. Since then, further applications have been developed, in which the process offers similar advantages.

The process involves the removal of the caustic by conversion to sodium carbonate, which can be washed out quite readily with hot water:

$$NaOH + NaHCO_3 \rightarrow Na_2CO_3 + H_2O$$

The elimination of the acid-souring treatment reduces health hazards and makes the use of acid-resistant equipment unnecessary. Of even greater importance is the improved quality of the goods. The use of hot washes in the acid treatment is dangerous to the fabric, but entirely safe in the bicarbonate process and gives a fabric that is whiter, cleaner, softer and more absorbent—factors that aid in dyeing.

The following comparisons demonstrate the value of the bicarbonate process for various applications:

Treatment of Open Width Heavy Fabrics

(after continuous jig scouring or mercerizing)

Acid Process

1st soaper—4 boxes cold water;
1 box cold 1% acid. (Goods allowed to lie ½ hr. for complete acid penetration.)
2nd soaper—4 boxes cold water;
1 box soda ash.
3rd soaper—4 boxes water (hot or cold).

Bicarbonate Process

1st soaper—4 boxes hot water;
1 box hot 3% bicarbonate.
2nd soaper—4 boxes hot water.

Warp Yarn Mercerizing

(Using 16-18 compartment open soaper)

Acid Process

1. Impregnate goods with caustic in the first several compartments.
2. Wash with 3 boxes hot water, one box cold.
3. Sour with 0.05—1.0% sulfuric acid.
4. Use remaining compartments for cold washes.

Bicarbonate Process

1. Impregnate goods with caustic in the first several compartments.
2. Wash with 4 boxes hot water.
3. Remove caustic with 3% hot (140°-160° F.) bicarbonate solution, which should be sufficient for yarns as heavy as No. 20. Add 1 lb. bicarbonate per 100 lbs. yarn mercerized.
4. The remaining compartments are used for washes, which should be as hot as possible, counterflowed together in groups of three.

* Dubeau, A. L., and Vincent, G. P. *Textile World*, May, 1943.

Removing Caustic After Kiering

Acid Process

1. The caustic from the kiering process is dropped and the goods are washed with warm water in the kier.
2. The goods are pulled through cold rope washers and soured with sulfuric acid.
3. The goods are allowed to lie for 20 minutes.
4. Wash with cold water.
5. Bleach.

Bicarbonate Process

1. The caustic from the kiering process is dropped and the goods are washed with hot water in the kier.
2. This water is dropped and a hot bicarbonate solution is circulated through the goods in the kier for about 1 hour.
3. The goods are pulled from the kier and washed with hot or cold water.
4. Bleach.

Removing Caustic After Steaming and Before Bleaching

(New continuous bleaching processes, available after the war)

Acid Process

1. After removal from caustic steamer the cloth is given one hot wash, and one cold wash.
2. It is then impregnated with sulfuric acid.
3. This is followed by two cold washes.
4. Bleaching operations can then be carried out.

Bicarbonate Process

1. After removal from caustic steamer the cloth is giv two hot washes.
2. It is then passed into a 3% solution of hot (14 160° F.) sodium bicarbonate.
3. This is followed by two hot washes.
4. The bleaching operation follows.

This comparison of the customary acid treatment wi the new bicarbonate process shows that the latter has t following advantages:

1. It permits hot washes, giving a cloth of improv quality.
2. It makes careful chemical control much less critic The recommended concentration of 3% bicarbon may be exceeded without damaging the fabric.
3. It reduces the number of steps in some process only two soapers are required in the treatment open width heavy fabrics, instead of the usual three in the kiering process, the cloth can be treated wit bicarbonate in the kier, whereas it would have to b transferred before acid treatment.

In addition to the improved quality of the cloth, th saving of equipment costs, and the increased safety of th process, both as regards the worker and the materials in volved, the bicarbonate process may also aid in speedin up production.

TRADE NOTES • NEW PRODUCTS

OBITUARY

THEODORE G. JOSLIN

THEODORE G. JOSLIN, Director of Public Relations, E. I. du Pont de Nemours & Co., and secretary to President Hoover during his term in the White House, died April 12 after a heart attack. Stricken in his office shortly after arriving for the day, he died an hour later. He was 54 years old.

A Washington correspondent for newspapers and national magazines, Mr. Joslin left the journalistic field five years ago to head the Du Pont Public Relations Department. Since joining the company he had appeared frequently before industrial and trade groups as a speaker.

From March, 1931, until March, 1933, Mr. Joslin served as Secretary to President Hoover, an experience he later recorded in a history of the Hoover administration, "Hoover Off the Record." In 1933 he became associated with Roger W. Babson, economist, and initiated Babson's Washington Reports, which interpreted Washington affairs to clients. He came to Wilmington in 1936 as president of the News-Journal Company and was appointed to the Du Pont Company post in 1939. He was a member of the Gridiron Club and the National Press Club in Washington, D. C., and of the Wilmington Country Club and Wilmington Club at Wilmington, Del.

His wife survives, as do two sons, Richard H. Joslin, of the Du Pont Company's Nylon Division, and Lieutenant Robert E. Joslin of the U. S. Army.

JOHN C. BROOKS

JOHN C. BROOKS, Vice-President and Director of Monsanto Chemical Company and General Manager of its Plastics Division at Springfield, Mass., died recently on a train en route from St. Louis to New York.

Mr. Brooks was born on April 7, 1886 in Westfield, Mass. He attended Massachusetts Institute of Technology and was graduated in 1908. He entered the plastics industry in 1922 as General Manager of the Fiberloid Corporation, later becoming its President. When Fiberloid Corporation became the nucleus of Monsanto's Plastics Division, Mr. Brooks was appointed a Vice-President of Monsanto Chemical Company and General Manager of the Plastics Division. In addition to this position, Mr. Brooks was President and a Director of Shawinigan Resins Corporation, a Monsanto affiliate.

He is survived by his wife and two children.

• NEW JACQUES WOLF REPRESENTATIVE

Charles Hagelgans, well known to the textile industry in Pennsylvania, will represent Jacques Wolf & Company in and around Philadelphia where he will act as technician and demonstrator of their chemical specialties.

• B. F. PERKINS APPOINTMENTS

B. F. Perkins & Sons, Inc., Holyoke, Mass., announces that J. Lewis Perkins, President, has been elected General Manager and William Woosnam, in charge of textile sales for 17 years, has been elected General Sales Manager. Mr. Perkins, president of the company for many years, will assume the additional duties of management. Mr. Woosnam, recently in charge of production on Navy and Merchant Marine contracts, was a member of the American Commission of Industrial Development sent to Russia 15 years ago.

• S.O.C.M.A. MEETING

The regular monthly luncheon and meeting of the S.O.C.M.A. was held on Friday, April 14, at the Midston House, New York City. The next meeting of the Association will be held on Thursday, May 11, at the Midston House, 22 E. 38th St., New York City.

SANDOZ PRESENTS *The color achievement of the month*

Piquant Pastels BY DAN RIVER MILLS

Piquant is the word for Dan River's new pastels, a criss-crossed pattern on woven cotton just hatched for the Spring sunshine.

Sandoz, whose products have helped create many a Spring-time color fashionable this year, congratulates both wearer and weaver.

Assisting many famous mills in the processing of textiles, Sandoz' technicians have developed a wide range of specialized chemical compounds for preparing, dyeing and finishing fibres. Our aim: the most attractive appearance, the most uniform wearability, and the lowest operating costs.

For example, a Sandoz-developed mercerizing agent, Mercerol, is known to produce the highest lustre, maximum production, at low cost. Among other chemicals furnished to today's Textile Leaders . . . are Sandozol KB, an especially reliable aid in dyeing . . . and Lubricant S, a new Sandoz-developed synthetic binder for easier slashing.

To help you select auxiliary chemicals for specific needs as well as a broad range of acid, chrome, direct and other dyes, Sandoz application laboratories are ready to serve you in New York, Boston, Philadelphia, Charlotte, Los Angeles and Toronto. You will find stocks in those cities. Sandoz branch offices are located in Chicago, Paterson and Providence.

Next month's "Color Achievement" will feature the accomplishment of another Sandoz customer among the leaders of the Textile Industry.

SANDOZ CHEMICAL WORKS, INC., 61 VAN DAM STREET, NEW YORK 13, N. Y.

thinks ahead with textiles

SANDOZ

PRINT WORKS MANAGER

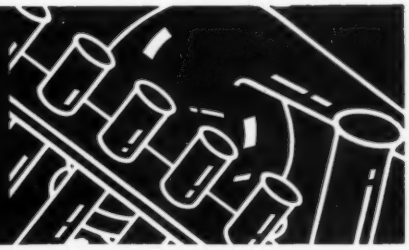
A leading textile organization requires the services of an executive capable of managing a large cotton printing and finishing plant. For the man whose background would qualify him for this important position, this is an excellent opportunity.

In order to protect respondents, all replies will be received and read only by top management and will be held in strict confidence. Write Box 545.

The men in our organization know of this advertisement.

BIXAMINE BROWN BRLL

- Direct
- Homogeneous
- Level Dyeing
- Excellent light fastness



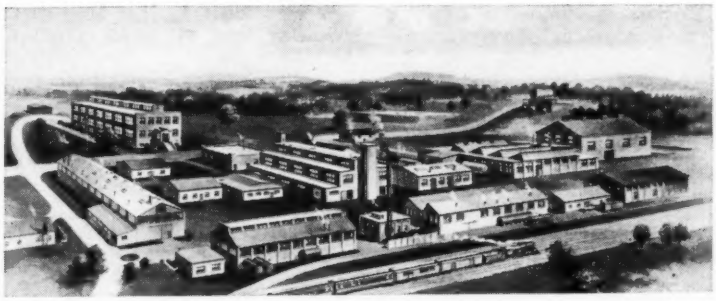
BICK & CO., Inc.

Manufacturing Chemists

Reading, Pa. Charlotte, N. C.

NYANZA

ANILINE & ALIZARINE COLORS
TEXTILE CHEMICALS



FACTORY AT ASHLAND, MASSACHUSETTS

NYANZA COLOR & CHEMICAL COMPANY, Inc.

215 WATER STREET NEW YORK CITY

FACTORIES:

CHEMICAL MANUFACTURING CO., ASHLAND, MASS. • NEW BRUNSWICK CHEMICAL CO., NEWARK, N. J

BRANCHES:

Ashland, Massachusetts

549 West Randolph St., Chicago, Ill. • 635 Drexel Bldg., Philadelphia, Pa. • 115 S.W. Fourth Ave., Portland, Ore
2657 Magnolia Ave., Knoxville, Tenn. • 304 E. Morehead St., Charlotte, N. C.

CANADIAN AGENTS:

Charles Albert Smith Limited, 123 Liberty St., Toronto, Canada

THE STANDARD DE-SIZING AGENT

RAPIDASE

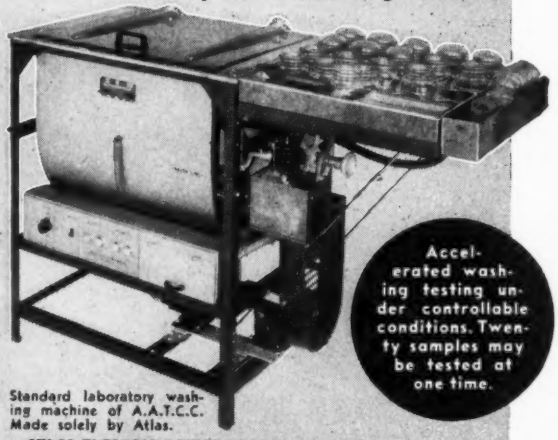
Dependable, speedy and economical de-sizing . . . Our technical staff always at your service.

for cottons rayons and mixed goods

WALLERSTEIN CO., INC.
180 MADISON AVENUE, NEW YORK

LAUNDER-OMETER

for Washing Tests—Mechanical Action—Color Fastness and Staining Tests—Detergent Tests—Fastness to Fulling Tests—Leather Dyeing Tests—Dry Cleaning Tests—Vat and Sulphur Dye Tests—General Laboratory Use—Shrinking Tests.



Accelerated washing testing under controllable conditions. Twenty samples may be tested at one time.

Standard laboratory washing machine of A.A.T.C.C. Made solely by Atlas.

ATLAS ELECTRIC DEVICES CO., 361 W. Superior St., Chicago

ATLAS-OMETERS

WEATHER-OMETER ★ LAUNDER-OMETER ★ FADE-OMETER

• Classified Advertisements

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $6.25 per column inch or less per insertion.

DYER WANTED: Experienced rayon acetate dyer for progressive metropolitan high standing plant. Permanent post-war position assured. State in detail school and plant experience, salary desired, age and man power situation. Box No. 515.

WANTED: Chemist-colorist by Dyestuff Manufacturer for standardization and application laboratory. Location—Massachusetts. Textile graduate preferred. State experience if any. Box No. 536.

POSITION WANTED: Experienced manager in the dyeing, printing and finishing industry desires to contact responsible organization with vision and foresight in the development and production of special finishes for the post-war trade. Will consider representing and demonstrating for a reliable chemical house. South territory preferred. Box 537.

WANTED: TEXTILE CHEMIST. There is an opening for a technically trained man in the sales organization of a company having national distribution in an extended line of chemicals now entering the textile field with specialized products. Association with cotton and wool finishing and previous sales experience desirable. Headquarters—New York area. All correspondence confidential. Box 546.

WANTED: RESEARCH CHEMIST for development work in laboratory of textile specialty manufacturer. Permanent position, if satisfactory. Must have good fundamental chemical education and at least 5 years experience in similar work. Metropolitan area. Give all essential data in letter of application. Box 547.

WANTED: SALES MANAGER commanding wide acquaintance among executives and technical personnel of leading textile manufacturers in East and South. Offered exceptional opportunity with large chemical manufacturer of textile finishing specialties. Box 548.

WANTED: TEXTILE CHEMICAL SPECIALTY SALESMAN. High salary PLUS to experienced man. Excellent opportunity in New England and New Jersey territory. Write fully. Box 549.

Additional Classifieds on Pages XXIX and XXX

NOTE

Essential employees need release statement. Employees who are to be hired for critical occupations need release statement and U. S. E. S. consent.

Classified Advertisements

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $6.25 per column inch or less per insertion.

WANTED: ASSISTANT SALES MANAGER. National organization manufacturing complete line of chemical specialties for textile industry has unusual opportunity for man who can qualify as assistant to sales manager. Technical school graduate with textile background preferred. Actual selling experience not essential, although desirable. Position ultimately will require traveling. Write, giving complete information, age, marital and draft status, references. Box 550.

WANTED: CHEMIST familiar with textile industry. Knowledge of emulsions will be helpful. Box 551.

POSITION WANTED: Colorist, 40 years of age, 12 years' experience on all synthetic fabrics for roller printing and attendant operations. Box 555.

Additional Classifieds on Pages XXVIII and XXX

NOTE

Essential employees need release statement. Employees who are to be hired for critical occupations need release statement and U. S. E. S. consent.

HYDROXY-MILDEW PROOF No. 2

to meet tentative Army Specifications T-1452A

One of many exclusive Kali products now in use for military and civilian textile production.

Other Textile Chemicals now in demand:

AQUAKAL* No. 73 for wetting out ducks for mineral or vat dyeing; re-wetting in sanforizing; for wetting piece goods, skeins, packages or raw stocks.

AQUAKAL No. 74, for pasting vat dyes.

HYDROXY*—WATER SHIELD

*(Reg. U. S. Pat. Off.)

Kali

MANUFACTURING COMPANY

Manufacturing Chemists

427 Moyer Street, Philadelphia 25, Pa.

INTEGRITY

The integrity and saleability of the textile product you send to market, are in no small way dependent upon the integrity of the oils and compounds you use for processing and finishing. The integrity of Zurnoil products has been proved by over 60 years of use for the efficient scouring, stripping, penetrating and finishing of every kind of fibre. Constant research, laboratory control of production and efficient manufacture maintain the integrity of Zurnoil products for today's ever changing fibre requirements. Your inquiries are solicited.

Zurnoil TEXTILE CHEMICALS

SCOUR "A"
Eliminates the use of soap

PENT LEV S. B.
Superior Penetrating Leveler

ALCOPHATE
(powder or paste)
Efficient Wetting Out, Penetraing and Leveling Agent

O. F. ZURN COMPANY

PHILADELPHIA 32, PA

KNOXVILLE, TENN. · HAMILTON, ONT., CANADA

QUALITY RICHMOND PRODUCTS

For Better
Worsted and Wool Dyeing
USE
DYESOLVE ESTER

BETTER Dye Disperser for Acid Dyes
BETTER Retardant—gives really Level Dyeing
PENETRATES Hair BETTER

Write for Free TRIAL Sample—
Enough for a trial run.

OUR TECHNICAL
DEPARTMENT IS
AT YOUR SERVICE

RICHMOND OIL, SOAP & CHEMICAL CO., Inc.
153-155 RICHMOND STREET, PHILADELPHIA 25, PA.

• CLASSIFIED ADVERTISEMENTS

The rate for "Position Wanted" advertisements in this colu is 2 cents a word—with a minimum of 50 cents per insertio For all other types of advertisements—i.e., help wanted, machine or supplies for sale—the rate is $6.25 per column inch or l per insertion.

WANTED: TEXTILE CHEMIST thoroughly ac quainted with analysis, control development and manufac ture of textile chemicals. Excellent salary and possibl bonus. State age, experience and background. Box No. 55

WANTED: CHEMIST for research and productio on pigments. Staten Island location. Permanent positio for right man. State education, experience and salary de sired. Box No. 553.

WANTED: Production man experienced in chemic plant. Permanent position in Staten Island. Give full fact concerning experience, education and salary desired. Bo No. 554.

Additional Classifieds on Pages XXVIII and XXIX

NOTE

Essential employees need release statement. Employees who are to be hired for critical occupations need release statement and U. S. E. S. consent.

HASTINGS IRISOL R S

COLOUR INDEX 1073

Hastings Irisol RS is a level dyeing acid violet of outstanding fastness to light. It is recommended for the dyeing of ladies' dress goods, carpet yarn, knitting yarn, upholstery material, hats, etc.

ZINSSER & COMPANY, Inc.
ESTABLISHED 1897
Manufacturing Chemists
HASTINGS-ON-HUDSON NEW YORK

For fabrics that answer the call to colors, SOLVAY Liquid Chlorine guards against *uneven colors and spotty bleaching.*

As an effective bleaching agent and water conditioner, SOLVAY Liquid Chlorine has been the "color guard" of fabrics. The highest standards of controlled quality, purity and uniformity are your assurance of satisfaction and dependability. Try SOLVAY Liquid Chlorine on your next job and get better results.

SOLVAY SALES CORPORATION

Alkalies and Chemical Products Manufactured by The Solvay Process Company

40 RECTOR STREET NEW YORK 6, N. Y.

BRANCH SALES OFFICES:

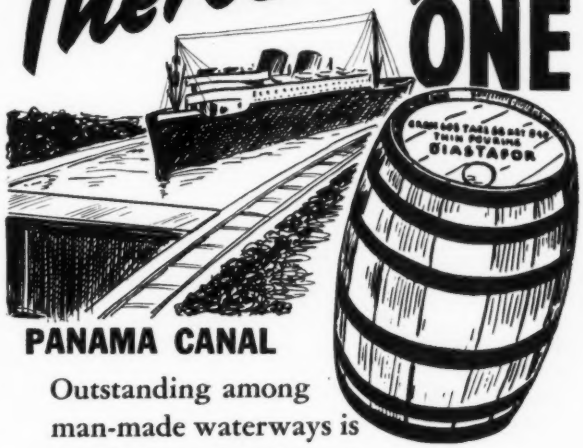
Boston • Charlotte • Chicago • Cincinnati
Cleveland • Detroit • New Orleans • New York
Philadelphia • Pittsburgh • St. Louis • Syracuse

SOLVAY

TRADE MARK REG. U. S. PAT. OFF.

LIQUID CHLORINE

There's only ONE



PANAMA CANAL

Outstanding among man-made waterways is the Panama Canal, greatest engineering feat of its kind ever attempted.

Outstanding in its own field is DIASTAFOR de-sizing agent, now in its 36th year of leadership. DIASTAFOR affords flawless results in the finishing of cotton, mixed goods and rayons, giving them ideal smoothness and suppleness without danger of discoloration, injured fibres or impaired tensile strength.

DIASTAFOR has won the approval of the nation's leading chemists and mill-owners. It is also used by our Armed Forces. Its superb quality and dependable uniformity make DIASTAFOR a must in most mills.

For further information, ask our technical man or write to

FLEISCHMANN'S DIASTAFOR

Diastafor Division of

Standard Brands Incorporated

40 Worth Street New York 13, N. Y.

DIASTAFOR

36 YEARS OF SATISFACTORY RESULTS

STAR PRODUCTS for PROCESSING MILITARY FABRICS

FUNGICIDE G

To meet government specifications for mildewproofing sleeping bags, webbing, tentage, shoe linings, tapes, mosquito netting, etc. . . non toxic . . non irritating.

ARKO FIRE RETARDANT

For flameproofing uniform cloth, tentage, felts, etc.

AQUAROL*

Produces a water-repellent finish on uniform cloth, overcoatings, and other military fabrics . . . used in a single bath treatment with Fungicide G to impart water-repellency and mildew resistance . . . used in a single bath treatment with Arko Fire Retardant to produce water-repellency and fire-resistance.

CULOFIX L*

For preventing color-bleed in water of direct dyed cotton.

*Reg. U.S. Pat. Off.

ARKANSAS CO., INC.

MANUFACTURERS OF AC INDUSTRIAL CHEMICALS

NEWARK NEW JERSEY

Established 40 years

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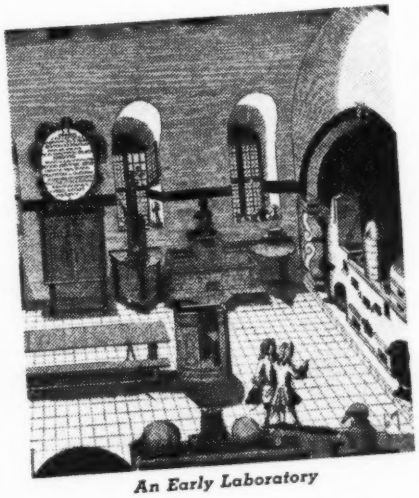
THE ROLE OF CHEMISTRY In the Development of Textiles

NO. 5 OF A SERIES

BEYOND THE LABORATORY



An Early Laboratory

IN THIS chemical age, we see evidence all around us of the wonders that can be brought to being in the laboratory.

Jean Antoine Claude Chaptal, though he lived more than a hundred years ago, (1756-1832), had the vision of a modern industrial chemist. He studied chemistry at Montpellier, obtaining his doctor's degree in 1777; and for a period occupied the chair of chemistry at the School of Medicine there.

With inherited capital, he established a chemical works where he manufactured mineral acids, alum, white lead and soda, as well as other substances. He developed the art of dyeing cotton Turkey red, using alum as a mordant for the dye, madder. And he also worked out a method of bleaching with vapor or fumes. His many achievements in applied chemistry were honored by both Napoleon and Louis XVIII.

Today, the whole textile industry realizes how definite and practical is the application of the chemist's work to the development of new fabrics and finishes. Textile men would surely say with Chaptal, "Chemistry casts its light not only on what is already known and practical but also creates each day new arts."

BURKART-SCHIER CHEMICAL CO.

Manufacturing Chemists for the Textile Industry. In peace and war, our products are always on the job improving the finish of yarns and fabrics.

CHATTANOOGA, TENNESSEE

BURK-SCHIER

PENETRANTS DETERGENTS SOFTENERS REPELLENTS FINISHES

The same...

high quality at low cost

consistently maintained

in peace and war

LYKOPON

SODIUM HYDROSULFITE

LYKOPON *is a trade-mark, Reg. U. S. Pat. Off.*

3 awards to Rohm & Haas Company and its associated firms, The Resinous Products & Chemical Company and Charles Lennig & Company.

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Manufacturers of Chemicals for the Textile, Leather and other Industries . . . Plastics . . . Synthetic Insecticides . . . Fungicides . . . Enzymes

LEVELENE*

FREE FLOWING, NON-JELLING

More than a trade name.

A penetrant and levelling medium for direct, union, and CELANESE* dyes.

Effective either for stripping or for level dyeing when working with many of the vat type dyes.

A stable, dispersing penetrant for rotproof and mildewproof processing.

Economical and labor saving.

RATHER than ask for a laboratory sample—HAVE one of our technical men bring with him a sufficient quantity for a practical mill run. THEN judge for yourself as many mills have done and profited thereby.

*Reg. U. S. Pat. Off.

AMERICAN ANILINE PRODUCTS, INC.
50 UNION SQUARE — NEW YORK, N. Y.

— Dyestuffs —
Plant: Lock Haven, Pa.

BRANCHES

Providence, R. I.
55 Pine Street

Philadelphia, Pa.
210 N. 13th Street

Toronto, Can.
Dominion Anilines & Chemicals, Ltd.
265 Adelaide Street West

Boston, Mass.
190 High Street

Chicago, Ill.
820 South Clinton Street

Charlotte, N. C.
301 East Seventh Street

Los Angeles, Cal. — 1019 South Grand Avenue

*Reg. U. S. Pat. Off.

FOR MILITARY OR CIVILIAN PRODUCTION

Official U. S. Marine Corps Ph

DISCOLITE*

(SODIUM SULPHOXYLATE FORMALDEHYDE)

Assures satisfactory results in both discharge an application printing of vat and direct colors.

This is because DISCOLITE is prepared under str laboratory control, and so is absolutely free fro harmful impurities, resulting in extreme cleanline in handling.

Our technical service department is at your com mand in connection with the use of DISCOLITE an other Royce Textile Chemicals.

The uniform strength and purity of DISCOLITE ar important for long runs and maximum efficiency Build your formulas on DISCOLITE.
It rewards confidence.

ROYCE CHEMICAL COMPANY

CARLTON HILL, NEW JERSEY

MANUFACTURERS OF HYDROSULPHITES, *VATROLITE, *DISCOLITE, *PAROLITE, ALSO *NEOZYME, *VELVORAY, *CASTROLITE, *FABRITEX, *GUMOLITE, *ROYCE

*REG. U. S. PAT. OFFICE

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